MODERN PLASTICS

FEBRUARY 1948

IN the nation's display windows and on assembly lines for producers' goods the phenolic plastics... and these are the Durez plastics... are showing their wonderful versatility. Even among the "general purpose" compounds, Durez continually provides buy-appeal and desired performance factors in new shapes, as shown here. These are the compounds your molder probably knows best, and can shape to your ends with impressive time and labor savings.

If you're in a hurry to get things moving, you'll find practical advantages in our continuing plant expansion program, perfected quality controls, and new laboratory facilities. As specialists in phenolics, we can advise you on material and finishing economies inherent in these plastics, and the use of mass production methods. Let us send you "Durez Plastics News," showing each month what other manufacturers are accomplishing with Durez.

"BUY-APPEAL" IS TAKING

Durez Plastics & Chemicals, Inc., 122 Walck Rd., North Tonawanda, N. Y.

many new shapes

IN RADIO HOUSINGS

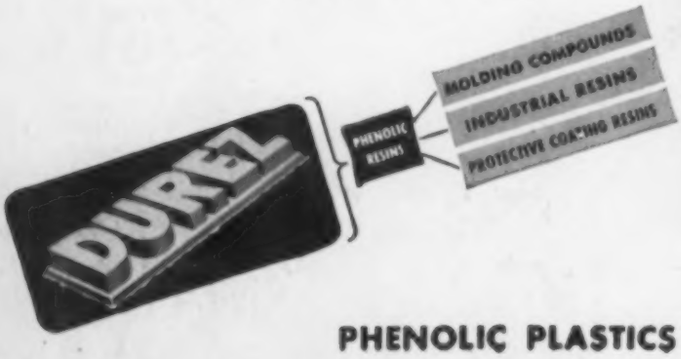
IN ELECTRICAL APPLIANCES

IN PERSONAL FILES

CONSUMER GOODS using Durez widely include this 5½ lb. A. C.-D. C. Sentinel "Treasure Chest" radio. Eight molded pieces comprise the housing and novel controls. Colors of ribbed cabinet harmonize with other Durez parts. Front cover has inner and outer shells with loop aerial between. Molded-in holes avoid the need for machining.

THE ELECTRIC MIXER gains much eye-appeal from its Durez one-piece motor housing and handle. This plastic is non-corrosive, easy to keep clean, sanitary. Its shape suggests the care with which intricate forms are obtained with Durez. Courtesy, Whippet Appliances, Inc.

BRAND NEW APPROACH to a willing market is the Moldmaster line of personal correspondence, card and stationary files for executives. Molded Durez handle and sides with embossed panelling produce a warm, modern treatment that gives new salability to old stand-bys. Produced and sold by Art Steel Sales Corporation.



PHENOLIC PLASTICS that fit the job

THE FRAGRANCE APPEAL OF YARDLEY... THE DISPLAY APPEAL OF *Catalin*

At perfume counters — where women rendezvous... and where fragrances vie continuously for feminine favor — most impressively stands Yardley's selected trio of essences... enthroned in Catalin.

Brilliant china red Catalin... genteel ivory Catalin... rich jet black Catalin — custom designed and combined in a manner that commands attention... catches the eye... and subtly proffers itself to sampling fingers. Thus, does it accomplish its sales mission!

An ingenious provision in the Catalin bases locks each individual flacon in a non-removable position... a feature necessary to an otherwise generous sales motivating, pre-sampling gesture.

In the realms of display, as in all fields, the use of Catalin creates an incomparable beauty of form — and of color. Its effect, one of luxury and quality, is also one of prestige, economically achieved... because very often stock sheets, rods, tubes or shapes can be effectively assembled into display units requiring no mold costs and very little fabrication.

Whether produced from available stock shapes or cast to customer specifications, the use of Catalin offers greater design flexibility — low tooling-up costs.

To gain the touch that is one of incomparable beauty, investigate Catalin for your next display or product projection. Our service staff will welcome the pleasure of assisting you. Inquiries invited!

CATALIN CORPORATION OF AMERICA

ONE PARK AVENUE • NEW YORK 16, N. Y.

Yardley counter display fabricated by Krest Mfg. Co., Inc., So. Norwalk, Conn.

CATALIN
THE GEM OF PLASTICS
Catalin

CAST RESINS • LIQUID RESINS • MOLDING COMPOUNDS

MODERN PLASTICS

VOLUME 25 FEBRUARY 1948 NUMBER 6

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Applicator made by Dorothy Gray.
Hycar part molded by Kirkhill Rubber Co.

THIS new lipstick applicator is made of HYCAR American rubber, improving the older-type brush applicator. This brush will never lose its bristles!

The designer had an idea—and from his idea may grow others for improving products or creating new ones. Certain definite characteristics of HYCAR met perfectly the requirements for the lipstick applicator. The tip is flexible, and is resistant to grease and oils. Unlike many types of rubber it takes well to color, brilliant or delicate. And finally, it is easy to process. Even in very small molds such as the one used for this product the work can be precise, craftsmanlike, and beautiful.

Versatile HYCAR American rubber has many qualities which make it desirable throughout industry. Latices of HYCAR may be used as impregnants for paper or cloth —or as adhesives in a wide range of applications. Its resistance to heat and cold, weather and wear, mean that it is among the most versatile of modern products.

We make no finished products from HYCAR—or from other B. F. Goodrich Chemical Company raw materials. However, we'll be glad to work with you on any special problems or applications. For more information, write B. F. Goodrich Chemical Company, Dept.O-2, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

Hycar
Reg. U.S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company
A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

MODERN PLASTICS*

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122 E. 42nd St., New York 17, N. Y.
Tel., MUrray Hill 3-0655

Circulation Department
Circulation Manager: FREDERICK A. KLEIN
32 Broadway, New York 4, N. Y.
Tel., WHitehall 4-4782

Branch Offices
Chicago 1: 221 N. La Salle St.
Manager: J. M. Connors
Tel., Randolph 5588
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Tel., Superior 0737
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Let's do it ourselves

The record shows that the plastics industry as a whole is doing a mighty fine job in many ways. It came through the slump of early 1947 with but few casualties, emerged a stronger and more healthy industry. Despite this progress, however, there is still a long road ahead. Though it is a road with many twists and turns, it is a road which will lead to a greater prosperity for all concerned. But some of these twists and turns can be made much easier and safer to negotiate if heed is taken of lessons already learned by a few—if serious and continuing attention is given to the all-important factors of informative labeling, merchandising, public relations, and training of salesmen.

If plastic products are to be accepted by the public and are to be properly used, informative labeling must not only tell what the product will do but it must also tell what the product will *not* do; it must tell the ultimate user how to care for the product and it must warn against abuse. However, in order that informative labeling may be most effective, there must be standards set up to prevent utter confusion.

Hand in hand with informative labeling goes the whole problem of merchandising. In the present-day buyer's market, sales programs cannot be maintained unless they are constantly revitalized by new designs, new products, new applications. With emphasis on these aspects, coupled with intelligently applied informative labeling, the public will more and more come to accept plastics—and to demand them.

Merchandising in one sense involves the over-all subject of public relations. Here is where the plastics industry has been woefully weak and where the Society of the Plastics Industry should be outstandingly strong. The public must be sold and re-sold on plastics. Last year the magazine *House Beautiful* did an outstanding public relations job for plastics. But the industry cannot depend solely upon outside sources such as this to carry the burden. Within itself it must keep the public constantly informed of progress in plastics and fully aware of the desirable things which plastics can do. Without seeming to be unduly immodest, we hope that the MODERN PLASTICS Seventh Plastics Competition (p. 87) will do its part as a public relations project for the industry.

Actually, all these lightly sketched facets can be consolidated in one word: education. The education must be spread over the whole gamut from manufacturer to distributor to salesmen to consumer. The job must be faced squarely and, we repeat, must fall largely upon the Society of the Plastics Industry. The industry has made great gains, particularly in the past six months. Now is the time to consolidate these gains through a constructive, hard-hitting, coordinated program of education.

How many moldings do you get per pound?

This E-Z Pour box top siphon, molded by the National Plastic Products Company, dramatically illustrates the increased moldings per pound that result from Styron's low specific gravity. One pound of these siphons amounts to 437 separate moldings . . . 437 separate sales opportunities! Add to that amazing economy the advantages of wide range of color, durability, and ease of molding . . . and you can see why once again Styron . . . America's Number 1 plastic . . . was chosen as the *right* plastic.

YOUR CHECK LIST FOR BETTER PLASTIC PRODUCTS

1. *Low specific gravity.* Styron (Dow Polystyrene) will give you a greater volume of moldings per pound than most thermoplastics . . . at a lower cost per pound.

2. *Excellent moldability.* Styron is noted for easy molding. Because it flows quickly and freely, Styron can be used in thin wall sections, which adds to the number of parts per pound.

3. *High rigidity.* Styron's stiffness makes possible the use of thin-walled sections in many pieces, without introducing excessive flexibility or requiring structural reinforcements.

4. *Freedom from warpage.* The rapid, uniform cooling and the natural rigidity of Styron eliminate costly losses from warpage. This often results in fewer rejects per pound of material used.

5. *Less scrap.* Not only can Styron be molded with smaller sprues, but the sprues, runners and gates can be directly remelted or rapidly reground and used again. Multiple cavity molds can be filled readily and this means a more favorable ratio of sprue and runner material to finished moldings. Styron's natural resistance to moisture prevents losses from moisture contamination.

6. *Plus values.* Styron also offers . . . Extensive Colorability . . . Beauty and Sales Appeal . . . Excellent Electrical Properties . . . Molding without Pre-drying . . . Chemical and Solvent Resistance . . . Temperature Versatility.

Let's go Selling with STYRON

Full color advertisements will soon appear in leading magazines announcing a new promotion for Styron. It's big, it's colorful, it's a Number 1 promotion to help you sell products made of America's Number 1 plastic!

If you have a technical problem or a sales problem, let's work it out together. Your nearest Dow office will be glad to help you put the right plastic in the right place . . . help you get more from your plastic production. If you have a problem in plastics . . . "let's work it out together."

PLASTICS DIVISION, DEPT. T-3

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit
Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

Attractive "Wall Kleen" switch plate molded for Western Switch Plate Co., South Gate, Calif.

ACCURATE MACHINE CONTROL

. . . assures proper molding!

This patented "Wall Kleen" switch plate molded by the South Gate Tool & Engineering Co., of South Gate, Calif., is an excellent example of the capabilities of the Reed-Prentice plastic injection molding machine. The shot is of polystyrene and covers 104 sq. in. of the mold. In spite of its area and thin section (only 1/16"), the finished piece shows no cold spots, shrinkage, stress marks or burning. The machine used is a 10D-8 Oz. model, operating at 105 cycles per hour.

Machine features which make possible the molding of this flawless shot include complete plasticizing under unvarying heat control — set to meet the specific requirements of the material in use; rapid injection of the material into the mold under controlled pressure and accurate control of timers governing the entire molding cycle.

The complete line of Reed-Prentice injection molding machines consisting of 4, 8, 10, 12, 16 and 24 Oz. capacities are designed to maintain these accurate controls, so indispensable to successful molding. Write Dept. D for full information and specifications.

THE WORLD'S LARGEST MANUFACTURERS OF INJECTION MOLDING MACHINES

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1213 W. 3rd Street

INJECTION
REED-PRENTICE CORP.
WORCESTER MACHINES MASS., U.S.A.

NEW YORK
75 West Street

LOS ANGELES
2328 S. Santa Fe Ave.

Molded of Celcon, the Durobilt seat is an example of the large size, tough, resilient and non-warping moldings possible with this Celanese *ethyl cellulose* plastic.

In comparison tests with other plastic materials, Celcon was selected because it best met the manufacturer's requirements, including resistance to cleaners, soaps, and antiseptics.

You'll find that Celcon has the qualities that consumer products need. Celcon molds fast, accurately . . . machines without stress crazing . . . holds fast to metal cores and inserts . . . drills without weakening . . . is available in full color range.

Check on Celcon with your Celanese representative. He will tell you what you need to know about this tough Celanese plastic. Celanese Corporation of America, Plastics Division, Dept. D-1, 180 Madison Avenue, New York 16, N.Y.

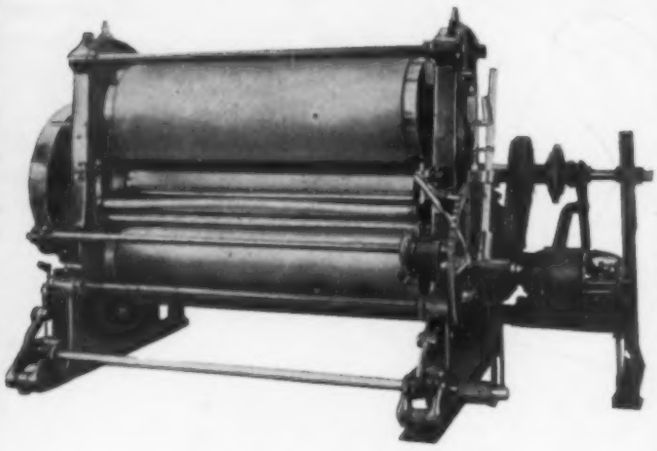
Molded by Arrow Plastics Corp., Passaic, N. J. for Plastic Appliance Mfg. Corp., 11-13 Maryland Avenue, Paterson, N. J.

Celanese* Plastics

*Reg. U. S. Pat. Off.

CUT PRODUCTION COSTS

Do your own Calendering

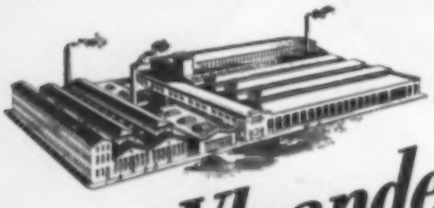


If you are one of many firms that pay large sums for farmed-out calendering work, you can save appreciably by selecting from our many types of calenders a machine to do the same work at lower cost.

Van Vlaanderen calenders are available in 2, 3, or 4 roller models with pressure from 7½ to 80 tons, equipped for cold or hot calendering by steam.

As the world's largest manufacturer of textile equipment we offer the processors of synthetic fabrics, films and sheeting a complete line of standard equipment to help solve processing problems. This means that you save machine designing costs and get production under way months sooner.

Check the list of products we manufacture (see below), then send a sample of your material and we will be glad to quote on your requirements.

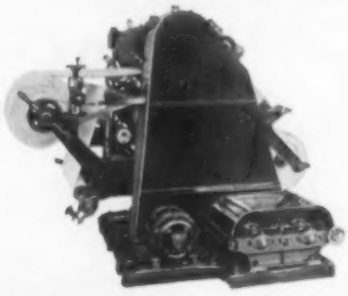


Van Vlaanderen

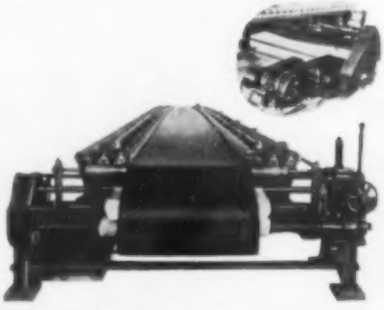
MACHINE COMPANY

370 Straight Street, Paterson, New Jersey

USE THESE STANDARD MACHINES FOR SYNTHETIC FABRICS



EMBOSSING. Two or three roll embossing machines are available in both male and female types. Rolls can be quickly interchanged. Made in hydraulic, lever or screw types.



TENTER FRAME. Tenter frames can be obtained with or without heat units. These are excellent for stretching or orienting extruded, calendered or cast sheets or film. Can be used on drying machines in coating operations.

BLEACHERS • BREAKERS • CALENDERS • CALENDER DRYERS CONTINUOUS WASHERS • COOLING CYLINDERS • COTTON BACK FINISHER DRYERS — ALL TYPES • DYEING MACHINES • ELECTRIC GUIDERS • EMBOSSING MACHINES • EXPANDERS • EXTRACTORS • FLOCK PRINTING MACHINES • GLASS CLOTH HANDLING EQUIPMENT • HEATING TOWERS • HYDRAULIC CALENDERS • IMPREGNATING MACHINES • MANGLES • MEASURING MACHINES • MIXING KETTLES • PAD DYEING MACHINES • PRINT WASHERS • ROLLING-UP MACHINES • ROLLS — RUBBER — PAPER • SINGEING MACHINES • SLACK PRINT WASHERS • SOAP WASHING MACHINES • SQUEEZERS • SUCTION MACHINES • TENSIONLESS CONSTANT SPEED DYE JIGS • TENTER FRAMES • TUBING MACHINES • WINDERS •

Here's another

NEW USE FOR

CO-RO-LITE

the versatile rope fibre plastic

ACWARE PLASTICS, in Los Angeles, California, find Co-Ro-Lite ideal for the manufacture of these picnic cases. Attractively made in different colors, the Co-Ro-Lite in this case is furnished in sheets all ready for molding.

CO-RO-LITE is a ready-to-mold, high-impact industrial plastic compound reinforced by long, tough rope fibres that form an interlocking system of remarkable qualities. It may be readily molded into compound curves and deep draws. Angles, channels and large shells are possible.

CO-RO-LITE is equally effective with fluid pressure or compression molding. The long, tough interlocking rope fibres reinforce all sections of the molded unit, imparting great impact, flexural, compressive and tensile strength. A range of densities comparable to wood is possible.

For *greater* strength, it's CO-RO-LITE, the rope fibre plastic. Consult our engineering department at any time. There is no charge or obligation, and you'll be amazed how Co-Ro-Lite, the *versatile* rope fibre plastic, can solve many of your difficult problems.

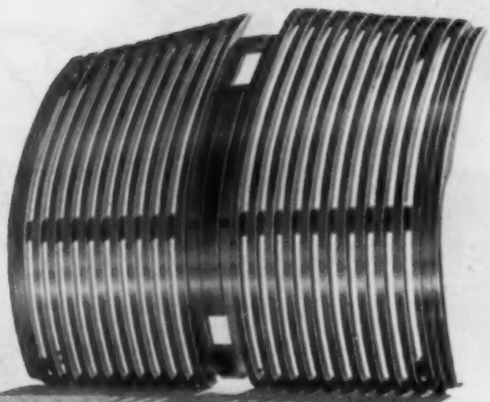
ALLIED PRODUCTS DIVISION

COLUMBIAN ROPE COMPANY

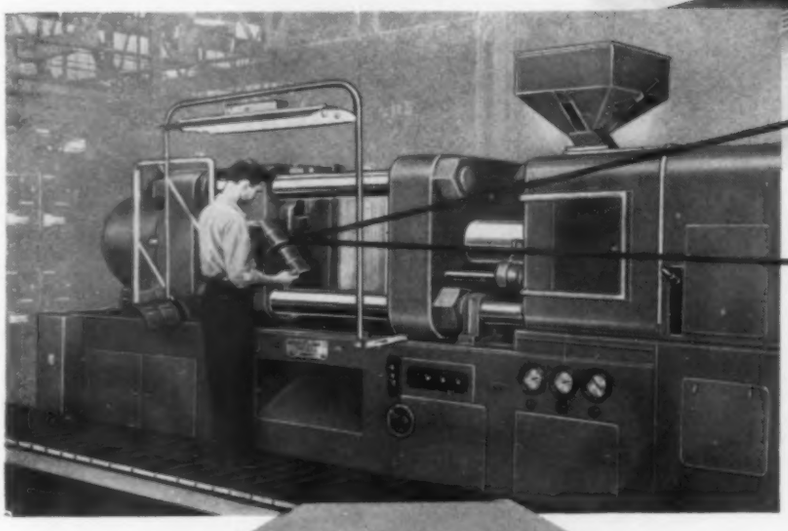
460-92 Genesee St., Auburn, "The Cordage City," N. Y.

Canadian Licensee: Canadian Bridge Engineering Company, Ltd., Box 157, Walkerville, Ontario, Canada.

HEAVY-DUTY, HIGH CAPACITY MOLDING



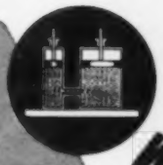
Radio Grills are molded of butyrate four at a time by Ford Motor Co. on a Watson-Stillman 80-oz. Injection Molding Machine. One operator; fully automatic cycle.



Four radio grills complete in one shot on world's largest injection molding machine

Tooled with a four-cavity mold for producing four radio grills at one time, the new Watson-Stillman 80-oz. Injection Molding Machine dominates the scene in the Ford Motor Company's Plastics Plant—largest in the automobile industry. The most advanced molding techniques assure extremely high dimensional stability, minimum finishing operations, low operating costs and full production schedules.

Is high-capacity molding to close tolerances required in *your* operation? Then write today for W-S "COMPLETELINE" bulletin 620-D—standard injection models from 1 to 80 oz. Further details from the Watson-Stillman agent nearest you.



WATSON-STILLMAN

FACTORY AND MAIN OFFICE
Roselle, New Jersey

BRANCH OFFICES
Philadelphia, Pa. • Chicago, Ill.

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DENVER, COLO.	Overgard Machine Tool Co.
DETROIT, MICH.	Peninsular Machinery Co.
DULUTH, MINN.	Anderson Machine Tool Co.
GRAND RAPIDS, MICH.	E. L. Essley Machinery Co.
HOUSTON, TEX.	Perry Machinery Co.
INDIANAPOLIS, IND.	W. K. Millholland Machinery Co.
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TULSA, OKLA.	Perry Machinery Co.

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Correspondents Throughout the World

MANUFACTURERS OF THE MOST COMPLETE LINE OF HYDRAULIC MACHINERY

1069

6 AT A TIME . . . 70 SECOND CYCLE with Automatic Molding

Here is a molding, by Pass & Seymour, Inc., Syracuse, N. Y., typical of the numerous electrical components made by this company, *Molded Automatically because this is the most economical way to produce such parts.* Here again the economies of Automatic Molding are forcibly demonstrated.

- Lowest labor cost.
- Highest quality parts, no assembly difficulties.
- Small mold, 6 cavities only.
- Production geared to requirements, no large inventory.

Pass & Seymour were among the first users of Automatics . . . now operate 9 of these presses, 3 shifts, with 1 unskilled attendant per shift. A skilled molder sets up and times the machines. There are many other advantages also. We should like to discuss them with you and make cost studies and recommendations.

Stokes No. 235 50-ton completely Automatic Molding Press. Patented in U. S. and abroad.

F. J. STOKES MACHINE CO., 5934 Tabor Road, Phila. 20, Pa.

Branch Offices in New York and Chicago

F.J.Stokes MOLDING EQUIPMENT FJS Est. 1895

Compare THIS VINYL FILM WITH ANY YOU HAVE EVER SEEN

for feel, drape, heat sealing qualities

HERIBEX* vinyl film has been developed through special formulations which we have compounded and resembles silk more closely than any other vinyl film yet produced commercially. HERIBEX film has a beautiful texture and the feel of a luxurious fabric. The surface has a dull sheen that reflects brilliant depths of color.

HERIBEX film has perfect heat sealing qualities, is practically non-porous and is ideally suited to roller or screen printing. It will not support combustion and will not flash. HERIBEX vinyl film is excellent for inflatables, tablecloths, draperies, shower curtains, raincoats, umbrellas, packaging, pocketbooks, furniture, luggage and many other applications.

AVAILABLE NOW

You can get HERIBEX vinyl film from stock or on a weekly or monthly allotment basis. Compare this film with any you have ever seen and we believe you will agree that HERIBEX is the finest vinyl film ever made. It is available in all standard widths, in thicknesses of .004" to .024", in seventeen basic colors, plain, clear or opaque. It can be obtained with a large variety of printed or embossed designs.

If you are interested in this superior vinyl film for any of your products, send us a completed coupon for a free sample today.

PRINT ON POLYETHYLENE

and other plastic films

HERIBERT, INC. also makes HERIBOL*, a group of special inks for beautiful prints on polyethylene, Saran and Pliofilm. HERIBOL inks can be supplied in a full variety of colors. Check the coupon now for a sample swatch printed with HERIBOL.

HERIBERT, Inc.

3501-03 Riverdale Avenue, New York 63, N. Y.

*Trademarks Registered

Telephone: Kingsbridge 3-

"Once a Pioneer... Always a Pioneer"

SAMPLE OF HERIBEX—SWATCH PRINTED WITH HERIBOL

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New York 63, N. Y.

Please send us ☐ a sample of HERIBEX vinyl film
☐ a swatch printed with HERIBOL ink

We want to use it for.....

NAME.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

COMMON SENSE ASSEMBLY ENGINEERING

HOLDS DOWN THE LID ON RISING COSTS

How would you assemble this smart looking bun warmer and vegetable casserole so as to hold down fastening costs and yet make sure of necessary security? The Heller Company chose Parker-Kalon Self-tapping Screws. *One operation* — driving each screw into a *plain untapped hole* — makes the required strong fastening. Troublesome tapping and mold-slowing inserts are eliminated. What could be simpler . . . what could save more?

Why let fastening costs get out of line if you can use the simpler P-K method. It not only saves time — it is also a valuable aid to designers. With P-K Self-tapping Screws, structures can often be simplified and improved; auxiliary devices eliminated; breakage and spoilage reduced; substantial savings secured in the cost of molded parts.

In 7 out of 10 jobs studied, P-K Screws will save up to 50% in assembly work hours. Find out if your assembly is one of the "lucky seven," and start making savings you've been missing. Call in a P-K Assembly Engineer. Or, mail assembly details to us for recommendations. Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.

Six P-K Type "F" Screws fasten the phenolic handles to the aluminum cover and pan. No cost-boosting inserts or tapping. Because a P-K Screw cuts its own close-fitting thread as it is turned in, a strong fastening is assured.

SOLD ONLY THROUGH ACCREDITED DISTRIBUTORS

P-K® Reg. U.S. Pat. Off.

A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY

TYPE "A" · TYPE "Z" · HEX HEAD TYPE "Z" · TYPE "F" · TYPE "U" · TYPE "F-Z" · TYPE "Z" PHILLIPS

PARKER-KALON SELF-TAPPING SCREWS

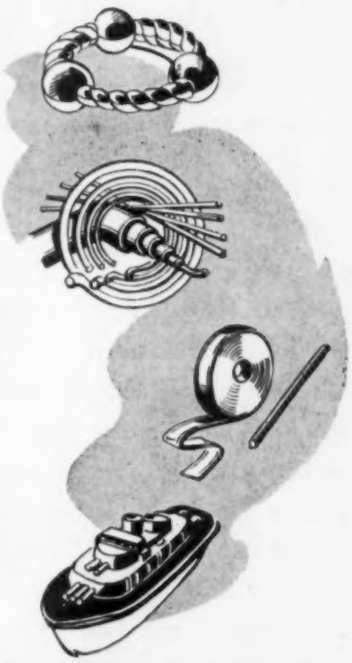
OTHER PARKER-KALON PRODUCTS COLD-FORGED SOCKET SCREWS • HARDENED SCREWNAILS AND MASONRY NAILS • SHUR-GRIP FILE AND SOLDER IRON HANDLES • METAL PUNCHES • DAMPER REGULATORS AND ACCESSORIES

You get the benefit of complete service when you give Celluplastic your order for EXTRUSION or INJECTION MOLDING

Celluplastic makes your job *as easy as possible* when you're in the market for extrusion or injection molding. That's because we can go to work for you while the product you want is still in the "idea stage." Simply give us your rough idea. We'll submit designs, specifications, blueprints, perspective drawings. We'll engineer your product, submit samples and quotations. We'll mold your product, assemble and ship it.

EXTRUSION MOLDING—We work in every thermoplastic material. We have the equipment to handle a vast variety and volume of special and standard shapes. We produce rods, tubes, belting, strips, ribbons, sheets, furniture webbing, etc., etc.

INJECTION MOLDING—We handle everything from small fittings to large cabinet surfaces. Machine capacity up to 22 ounce shots.



We have been specialists in plastics since 1919, and operate one of the world's finest plastics plants. For complete, rapid service—for superior extrusion and injection molding, *contact CELLUPLASTIC today.* Descriptive literature and further information on request.

ALSO AMERICA'S #1 SOURCE FOR PLASTIC CONTAINERS

Celluplastic Corporation

50 AVENUE L, NEWARK 5, N. J.

PLASTIC CONTAINERS — EXTRUSION AND INJECTION MOLDING

New York office: Rockefeller Center, 630 Fifth Avenue, Circle 6-2425 • Upper New York State: Dygert & Stone, Inc., 36 St. Paul St., Rochester 4 • West Coast: Container Service Co., 1266 Northwestern Ave., Los Angeles 27, Cal. • New England: Allen-Nelson Co., 603 Boylston St., Boston 15, Mass. • Michigan: L. T. Swallow & Associates, Boulevard Building, Detroit 2

CONTROL HIGH QUALITY

WITH THE

OLSEN PLASTIVERSAL

The Universal Testing Machine for Tension Compression—Flexure Testing of Plastics

Courtesy of Rohm & Haas Company, Philadelphia, Penna.

Today's Plastics Industry knows that the Olsen PLASTIVERSAL (Universal Testing Machine) plays an important part in their manufacturing programs. Providing dependably accurate records of precision tests on film, sheet, plates or blocks and molded specimens or parts, the PLASTIVERSAL makes possible the comparison, standardization, control and development of plastic materials. When equipped with the Olsen High Magnification Recorder the PLASTIVERSAL easily plots stress-strain curves and detailed analysis.

Simplicity of the PLASTIVERSAL design is your assurance of low maintenance costs, ease of operation, dependability and extreme accuracy — it is engineered to be a versatile instrument for testing both on the production line and in the laboratory.

The PLASTIVERSAL is but one of several Olsen machines designed for the testing of plastics — write today for full information.

TINIUS OLSEN

Testing & Balancing Machines

TINIUS OLSEN TESTING MACHINE CO.

580 North Twelfth Street, Philadelphia 23, Pa.

Representatives:

Pacific Scientific Co., Los Angeles, San Francisco, Seattle • Mine Smelter Supply Co., Denver, Colo.

Hinds

sets its cap . . .

Closure molded by
Mack Molding Co.

for more business!

A new and strikingly beautiful package has appeared on cosmetic counters—bearing one of the oldest and most successful names in its field. Notice the cap.

Does it "make" the package? Certainly it *helps!* Besides providing a tasteless, odorless, non-toxic, non-leaking closure, BAKELITE Styrene plastic lends its own natural, inherent beauty to an already beautiful and eye-winning design. The rich coral color, the smooth sheen, the rich "feel" of this fine plastic cap add much to the package.

Package designers are invited to "go the limit" with BAKELITE Styrene plastics. They offer so much! Unlimited color effects—or crystal clarity. Easy molding, in intricate or simple shapes. Rigid strength to resist shipping damage. And *low cost.*

Write Department 2 for further details on one of the most versatile of plastics for product and package styling!

TRADE-MARKS

BAKELITE

Styrene

PLASTICS

BAKELITE CORPORATION, *Unit of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N. Y.

MORE { WITCO QUALITY STEARATES

from A to Z

- ALUMINUM
- BARIUM
- CALCIUM
- LEAD
- LITHIUM
- MAGNESIUM
- SODIUM
- ZINC

With the completion of our new Stearates plant in Chicago, which supplements the facilities of our Brooklyn plant, prompt shipment of WITCO quality STEARATES can be made either from Chicago or New York. Each shipment represents over a quarter century of experience in the manufacture of Metallic Stearates.

Quality STEARATES for over a quarter of a century

Samples on Request

WITCO CHEMICAL COMPANY

MANUFACTURERS AND EXPORTERS

295 MADISON AVENUE · NEW YORK 17, NEW YORK

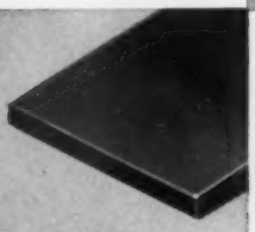
LOS ANGELES • BOSTON • CHICAGO • DETROIT • CLEVELAND • AKRON
SAN FRANCISCO • LONDON AND MANCHESTER, ENGLAND

TO HOLD GLASS

Automotive weatherstripping. Can be furnished in "Tutone", which is one color on inside, different color on outside.

TO SEW THROUGH

Sewing welt may be covered or uncovered when used on upholstery (auto or furniture) or seat covers.



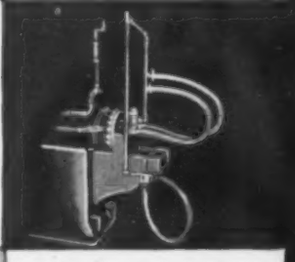
TO SIT ON

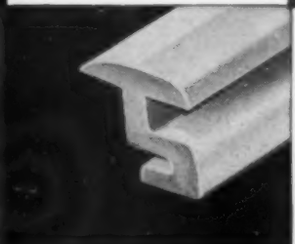
Interwoven strips may be heat sealed or nailed to chair frame, are elastic enough for easy sitting.

6 PRACTICAL USES *for* POLYVINYL CHLORIDE ELASTOMERIC EXTRUSIONS

TO PIPE LIQUIDS

Vinyl tubing is efficient for piping liquids. It is impervious to most chemicals. Makes fine garden hose.



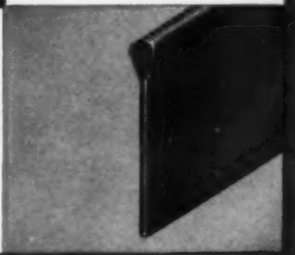


TO SEAL JOINTS

Washing machine window is sealed into the cover with this extruded pure-white gasket.

TO STOP RATTLES

This fender welt is bolted between fender and body to prevent rubbing of metal on metal.



● And very economical, too. These continuous extrusions can be made in almost any cross-section and in a wide variety of colors. Let MACOID discuss your application with you.

DETROIT MACOID CORPORATION

Originators of Dry Process Plastics Extrusion

12340 CLOVERDALE • DETROIT 4, MICHIGAN

EXTRUSION AND INJECTION MOLDING

NO, we aren't against Octopi. But we do believe in helping you beat today's tough competition through greater efficiency. That's why we recommend this Taylor Control System which runs any plastics molding press automatically. This particular setup was worked out for molding phonograph records. But it's versatile enough to be adapted to whatever product—or variety of products—you want to turn out.

Brains of the whole operation is the TAYLOR FLEX-O-TIMER. Here's what happens:

1. Flex-O-Timer simultaneously: **a.** *closes press . . .* **b.** *turns on steam . . .* **c.** *positions 3-way valve to connect discharge to steam trap.*

2. Next the Flex-O-Timer simultaneously: **a.** *turns steam off . . .* **b.** *turns water on . . .* **c.** *repositions 3-way valve connecting discharge to drain.*

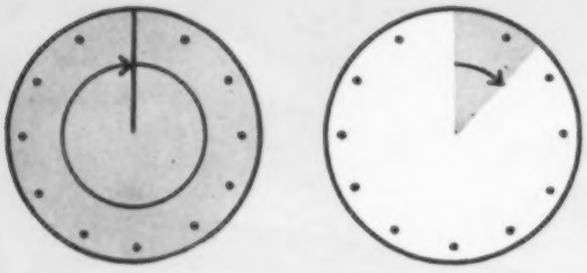
3. At end of molding period, the Flex-O-Timer: **a.** *opens the press . . .* **b.** *turns cooling water off . . .* **c.** *turns on steam for warm-up for next cycle . . .* **d.** *positions 3-way valve to connect discharge to steam trap . . .* **e.** *turns steam off and timer stops.*

Ask your Taylor Field Engineer or write today for Catalog No. 98154. Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

FOR YOUR INFORMATION

HERE'S A FASTER WAY TO A BETTER FINISH FOR YOUR PRODUCT... RESIMENE*



At 250° F. typical white enamel alkyd coating cures in 60-90 minutes baking. BUT with Resimene incorporated, the baking time is cut to 8-15 minutes.

Only too often fast flowing production lines are tied into knots by slow finishing processes. With Monsanto's *proved* organo-soluble melamine resins added to coatings, sharply reduced curing times accelerate deliveries without added equipment.

In addition, Resimene imparts these important performance qualities:

1.	Improved resistance to abrasion, scratching and marring.
2.	Improved resistance to alkalies and solvents.
3.	Increased surface hardness.
4.	Better color retention.

You might very well find extra efficiency and extra profits by specifying Resimene for your coatings. Special resins are available for special jobs. Use the coupon to get complete Resimene information, or write direct to Monsanto if you have a particular problem.

Plastics Progress Report

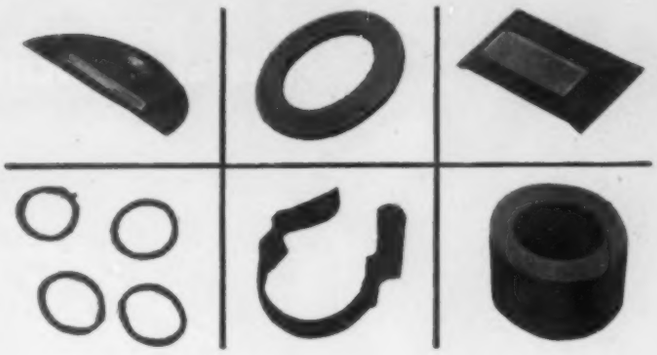
New, "dynamic" test methods now being developed by Monsanto research experts might very well be looked on as significant of the coming-of-age of plastics. Supplementing standard laboratory materials tests, these new methods work to close the gap that sometimes occurs between laboratory findings and plastics performance under use conditions. Unusual stresses and strains, temperature differentials, manufacturing conditions, performance problems, etc., are taken under consideration.

As a result, commercial development of new materials and formulations is hastened. New and valuable data on existing plastics is established. Broader, fundamental knowledge of special formulations is increased. On the whole, the scope of plastics for *all* industry is broadened and plastics applications become more precise and certain.

This new development is typical of the many ways Monsanto reaches ahead for more information . . . new methods . . . new materials . . . for *you*. The benefits of Monsanto's leadership in the field of plastics are available to you at all times. Use the coupon opposite for complete details on the versatile family of Monsanto plastics . . . expert advice on your plastics problems. *Reg. U. S. Pat. Off.

News about Plastics from Monsanto Chemical Company | **FEBRUARY...1948**

WHAT DO YOU MAKE FROM INDUSTRIAL RESINS?



Unless you've kept right up to the minute on the many applications of Resinox* and Resimene industrial resins... chances are you're missing an opportunity to use and profit by these versatile, useful thermosetting resins.

New applications in the field of laminating, bonding and impregnating come to attention almost daily. Alert manufacturers, molders, designers and materials researchers are working with these Monsanto resins to bring forward *new materials* with exciting, new performance qualities . . . profitable production advantages.

It will pay you to know more about Resinox and Resimene industrial resins. Use the coupon on this page for further information and technical data, or write direct for the advice of Monsanto experts.

No matter what you make or design, it may pay you well to check this outline of applications for Monsanto's industrial resins:

LAMINATING RESINS . . . for laminating wood veneers, paper and fabric into tough, impact-resistant laminates for a variety of purposes . . . wall paneling, table tops, gears, electrical insulators, radio parts, etc. They can be prepared to offer excellent electrical properties, chemical resistance, postforming qualities and resistance to weathering and aging.

GRINDING WHEEL RESINS . . . for binding the components of abrasive wheels into stronger, more dense and more resilient wheels. Special formulations to meet special requirements.

BRAKE LINING RESINS . . . for impregnating and bonding components of high friction, long wearing, tough, stable brake linings and clutch facings.

SPECIALTY RESINS . . . for impregnating paper for plywood overlays, for bonding glass and mineral wool insulation into handy bats, for wire enameling and for special adhesive purposes.

LUSTREX handles a hot job

When the manufacturers of this doughnut maker decided to capitalize on the advantages of plastics for their product, they picked Lustrex. In addition to the established selling and production superiorities of polystyrene, this new Monsanto thermoplastic offers a heat distortion point of 194-198° F. In the graph below, Lustrex' other qualities as demonstrated in ASTM tests are shown:

Property	Lustrex
Molding Quality	Excellent
Injection Molding Temp. (°F)	350-525
Injection Molding Press. (psi)	10,000 up
Specific Gravity	1.05
Flexural Strength (psi)	12,000-16,000
Flexural Deflection (inches)	0.15-0.30
Tensile Strength (psi)	8,000-9,000
Modulus of Elasticity in Tension psi x 10^5	5.0-6.0
Elongation (%)	3.2-3.6
Impact Strength (ft. lbs./in.) Izod (notched)	0.25-0.40
Rockwell Hardness	M65-75
Heat Distortion (oil bath) °F	194-198
Heat Distortion (air bath) °F	188-192
Dielectric Const. @ 1Mc	2.5-2.7
Dielectric Const. @ 1Kc	
Dielectric Strength (v./mil.)	>400
Power Factor @ 1Mc	0.0001-0.0005
Power Factor @ 1Kc	
Water Absorption (24 hrs.) %	0.04-0.05
Chemical Resistance	No effect from weak acids and bases or strong bases. Strong oxidizing acids attack
Solubility	Soluble in esters, aromatics, higher alcohols and chlorinated hydrocarbons.
Clarity	Slight yellow haze
Color Possibilities	Almost Unlimited

MONSANTO
CHEMICALS — PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

USE THIS COUPON TO BRING YOU PROMPTLY FULL INFORMATION ON MONSANTO PLASTICS

MONSANTO CHEMICAL COMPANY
Plastics Division
Springfield 2, Mass.

Please send me information on.....General (12 basic Monsanto Plastics)

.....Resimene.....Resinox and Resimene Industrial Resins

.....Lustrex.

Name.....Title.....

Firm.....

Type of Business.....

Address.....

City.....State.....

Now...

PROTECT THE HOURS AND DOLLARS YOU INVEST IN MOLDMAKING...*3 ways!*

1. DURING HOBBING! Here is a new, case-hardening Mold Steel that gives you the ease of hobbing normally found only in hobbing irons! Carpenter *Mirromold* enables you to hob deep, accurate cavities that polish to a high, lustrous finish. The addition of Vanadium serves as a refining agent and insures a uniform, fine-grained case in the heat treated mold.

2. DURING HEAT TREATING! You can *depend* on *Mirromold* to respond uniformly to heat treatment. The *Mirromold* you use today, next month, or a year from now, will always respond the same. Write for the new *Mirromold* leaflet—it gives you all the data you need to put this new Mold Steel to work.

3. ON THE JOB! To make sure you get only clean, sound steel, *Mirromold* is produced with the same painstaking control used in the manufacture of all Carpenter Tool Steels. Thus, you virtually eliminate the danger of having to scrap an expensive mold because of defective steel. Your mold investment is safeguarded by a hot acid inspection, and all *Mirromold* bars carry the well-known "Diok" Label.

Los Angeles Molded Products Co. made the multiple-hobbed fountain pen cavities from Carpenter's new, easy-to-hob *Mirromold.*

These cavities were hobbed into Carpenter *Mirromold* on a 40-ton hobbing press with a hob made from Carpenter *Vega* (Air-Tough) Tool Steel. The cavities are 3⅝" deep, have a .170" radius in the bottom, and a .447" diameter at the top. The blank is 1½" rd. x 4½" long with a relief of .020 on the sides. Approximately 15 minutes were used for each push. *Mirromold's* maximum hobability, uniform response to heat treatment, and guaranteed cleanness and uniformity fully protected the time and money spent on the job. (Note the sleek, hi-lustre finishes on the unretouched fountain pen barrels.)

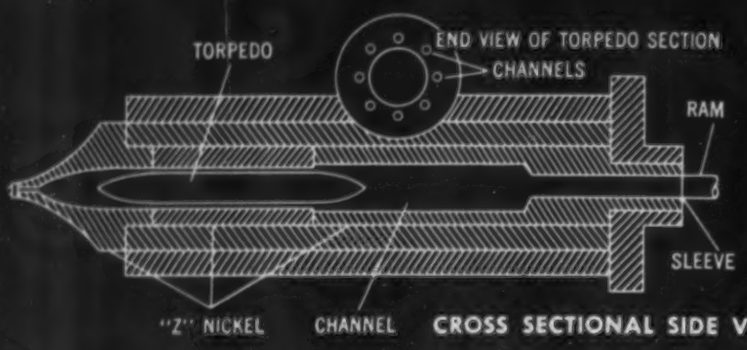
THE NEW MOLD STEEL
that protects your moldmaking investment

Carpenter
MIRROMOLD

*100% ACID DISC INSPECTED

The Carpenter Steel Company, 112 W. Bern Street, Reading, Pa.

What "Z"* Nickel does on this tough job...



1. WITHSTANDS CORROSIVE ACTION
2. RESISTS ABRASION BY GRANULAR PLASTIC
3. ELIMINATES FREEZING OF CYLINDER AND RAM

IT CAN ALSO DO ON YOURS!

This machine is designed to handle a wide range of moldable plastics—including all the cellulose compounds and vinyl resins.

Molding these modern plastics can bring about problems of metal contamination . . . wear . . . destructive abrasion. And trouble . . . for injection machine cylinders.

The one illustrated above was no exception *before* it was redesigned.

For this tough job plated material proved troublesome. The plating broke down and chipped off, galling both cylinder and ram.

And that wasn't all. Plating didn't adequately protect the long, narrow channels of the torpedo section.

So the Plastic Die & Tool Corporation, Los Angeles, Calif., developed a new injection cylinder . . . without plated metals in the trouble spots. They made the cylinder in sections to reduce the number of machining operations, and to simplify replacement of worn parts.

But now . . . replacements are seldom needed! The parts are made of "Z"* Nickel.

And "Z" Nickel is especially suited for plastic extrusion dies. It possesses high heat-treated hardness and superior resistance to corrosion, abrasion and wear. Thermally hardenable to Rockwell C 40-45 after fabrication, "Z" Nickel is stronger and tougher than mild steel . . . as corrosion resistant as pure Nickel itself.

Investigate "Z" Nickel whenever you need a metal for plastic injection applications. And be *sure* to remember it for tough jobs that have never been handled satisfactorily by other metals.

*Reg. U.S. Pat. Off.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET NEW YORK 5, N. Y.

"Z"* NICKEL

NICKEL (INCO TRADE MARK) ALLOYS

MONEL* • "K"* MONEL • "S"* MONEL • "R"* MONEL • "KR"* MONEL • INCONEL* • "Z"* NICKEL • NICKEL • "L"* NICKEL

more *Practical* applications of

One or more of the well-known qualities of phenolic compounds make them ideal for *each* of these products . . . Where durability, good finish, low cost, or resistance to heat and electricity are essential, dependable phenolics are unexcelled.

Northern Industrial Chemical Co. makes all of these products from Interlake Compounds. Interlake powders are used because they are fast-curing, consistently uniform and have excellent mold-release qualities . . . For these important reasons, Interlake Molding Compounds are being used in more and more of America's leading products.

7 Basic Types of INTERLAKE Molding Compounds

General Purpose
Improved General Purpose
Non-Cracking
Heat-Resistant
Mineral Filled
Semi-Impact
Impact

Detailed Specifications upon request.

Aeroflex Tubing, illustration courtesy Anchor Plastics Company, Inc.

Example of the use of extruded plastics for long-life and dependable service

THE pen manufacturer wanted the best to assure smooth writing and service-free long life.

Anchor Plastics Company, pioneer custom extruders of thermoplastics, are meeting every requirement set up by the pen maker.

The illustration shows a spiral wound coil of thin-walled polyethylene tubing down which the ink flows. This ink reservoir is enclosed in an outer tube of Tenite II.

The assembly is held to close tolerances to provide fine writing characteristics and is of course impervious to the corrosive action of ink.

There are hundreds of different applications of extruded plastics that are improving the performance, lengthening the life, reducing costs, or adding color to all kinds of products.

Manufacturers who are using the speedy, continuous and economical extrusion process are gaining other advantages, including the saving of buffing and polishing operations, maintaining close control over physical properties and meeting exacting mechanical tolerances.

Most of today's plastics extruding volume comes from NRM extruders, for NRM is the leading manufacturer of extruding equipment.

Experienced NRM engineers are ready to help you. Write today and learn how NRM plastics extruders can be used to *your* advantage.

NRM

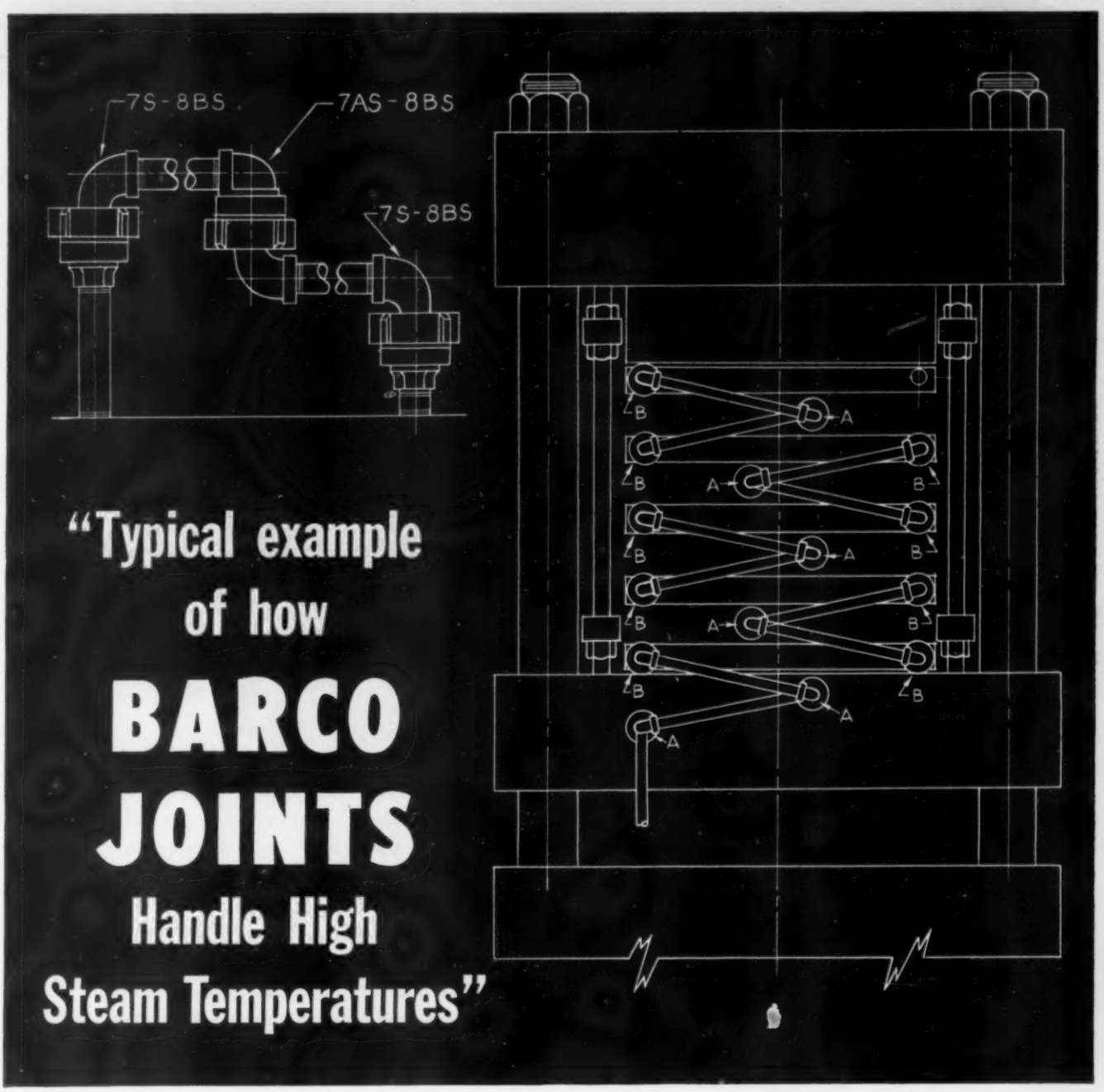
NATIONAL RUBBER MACHINERY CO.

General Offices: AKRON 8, OHIO

California Representative: Sam Kipp, P. O. Box 441, Pasadena 18, Calif.

Plastics MACHINERY DIVISION

EXPORT DISTRIBUTORS: OMNI PRODUCTS CORPORATION, 460 FOURTH AVE., NEW YORK 16, N. Y.



"Typical example of how BARCO JOINTS Handle High Steam Temperatures"

This 4-deck rubber press is one of the many industrial applications that depend on Barco Flexible Joints for steam heating on movable platens. Barco joints compensate for misalignment and expansion due to their ball seat construction, insuring longer life to fluid-conveying systems. Barco will not leak under alternating steam and cold water. You will find these economical life-savers at work in every branch of transportation and industry For more information, write Barco Manufacturing Company, 1809 Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Co., Ltd., Montreal, Canada.

BARCO FLEXIBLE JOINTS

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY

Not just a swivel joint ...but a combination of a swivel and ball joint with rotary motion and responsive movement through every angle.

"MOVE IN EVERY DIRECTION"

MOLDING THE CONSUMER'S FRIENDSHIP

A bottle cap that is also a measuring cup is a feature example of the plastics products developed by Shaw Insulator Company. It's an extra that makes friends.

Shaw knows how to get plastics to do their part in making such conveniences economical and practical. The bottle caps above are molded of shell pink urea formaldehyde in a six-cavity, semi-automatic compression mold. Air powered side cylinders were used, permitting operation of the mold on a very fast cycle — a definite production advantage for a difficult part such as this.

Consumers look for the product that looks out for them. If your product involves the use of plastics, then be sure you are meeting this requirement most effectively and economically — call upon Shaw to do your molding.

SHAW

SHAW INSULATOR COMPANY

MOLDERS SINCE 1892

160 COIT STREET IRVINGTON 11, N. J.

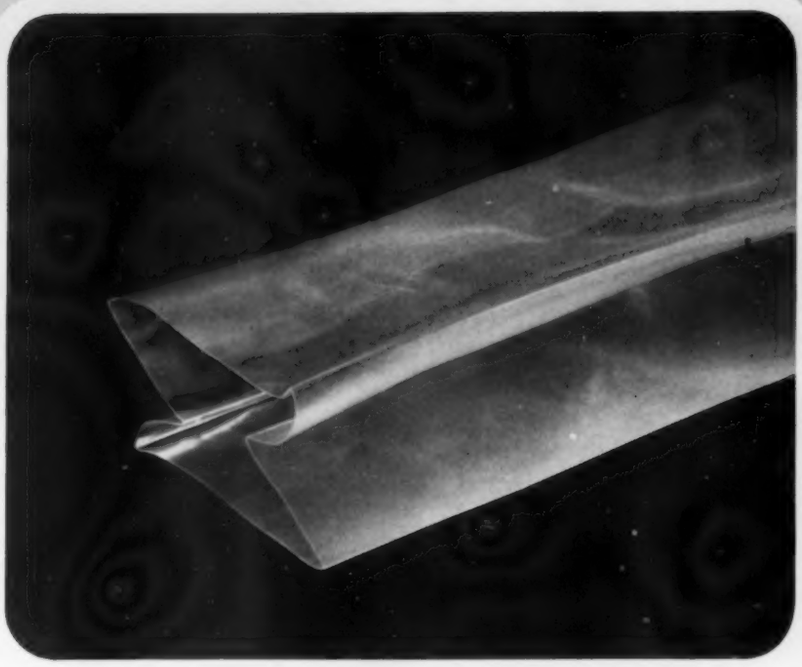
PLASTICS LITERATURE AVAILABLE

Shaw engineers have prepared a variety of literature, study of which might help you to a decision. Simply write a note about what phases of plastics especially interest you.

Or, you may prefer at once to call in a Shaw engineer, and present your problems for his study. This company's fifty-five years of plastics experience gives him a rich background from which you can draw.

Between the resources of Shaw and the Plax Corporation, Hartford 5, Conn., you can obtain assistance in almost all plastics methods and materials.

• NOW "IT" COMES WITH A GUSSET •



"It" is Plax Polyethylene Layflat Tubing. And it has the added advantage of being gusseted for even easier application as a tough, protective bag, pouch or envelope.

Seamless, flexible, non-toxic, Plax gusseted Polyethylene Layflat Tubing can be cold-stretched several hundred per cent. Moisture-proof and chemically inert, it makes an excellent package for everything from food to corrosive chemicals.

Produced in continuous lengths for ready adaptation to packaging lines, this new type of Layflat Tubing is available in many colors. Please write Plax for complete details.

CHART ON "HOW TO USE PLASTICS"

Now available for the asking is a table of properties for six materials available from Plax in various forms and formulae. This has been incorporated in the Plax catalog, which also contains helpful information on the primary uses of each material.

A copy will be sent promptly upon receipt of your request.

Between the resources of Shaw Insulator Company, Irvington 11, N. J., and Plax Corporation, Hartford 5, Conn., you can find help on virtually every material and method in plastics today.

PLAX
FOR PLASTICS
NOT SUBSTITUTES··· IMPROVEMENTS

133 WALNUT STREET- ★ HARTFORD 5, CONNECTICUT
In Canada – Canadian Industries, Ltd., Montreal

GENERAL ELECTRIC CO.

bought 17 Defiance Preform Presses

Result:

Increased Production ... Saved Labor

In General Electric's molding plants—they have *seventeen* Defiance Model 20 Plastic Preform Presses!

The result—less labor, more output, lower costs!

With Defiance machines running at 60 SPM, one operator can handle two #20 presses—loading and taking away. During three shifts, production from a large die (over 300 gr.) can average 1600 to 1800 lbs. per shift per machine. Die change and cleanup in only 30 minutes for solid die; 45 to 60 minutes for core. Multi cavity dies pay off rapidly.

Write for bulletins on Model 20; also Model 45 for preforms up to 28 sq. in. max. area, or multiple of small size. Defiance Machine Works, Inc., Defiance, Ohio.

DEFIANCE

PLASTIC PREFORM PRESSES

98 YEARS OF PRECISION MANUFACTURING

Here is new... molding efficiency..!

Another prominent plastics molder tells about the premium performance of

THERMALL

ELECTRONIC HEAT GENERATORS

Illustrated is a THERMALL CHIEF, a loading board preheater. On this job it is being used as a general purpose preheater. This is an example of the flexibility of THERMALL preheating equipment.

THERMALL CHIEF

Width .....28"
Depth .....21"
Height (Work Level)..39"
Heat Capacity.....1½ lbs. (per minute)

TECH-ART PLASTICS COMPANY

34th Ave and 41st Street • LONG ISLAND CITY, N. Y. • Tel. Allerie 9-6850-1
SUCCESSORS TO DOONTON RUBBER MANUFACTURING COMPANY

MOLDERS OF THE ABOVE RADIO CABINET

WRITE:

"THERMALL High Frequency Preheating reduced the molding cycle for a 6½ pound radio cabinet from six minutes to 3½ minutes. A tremendous improvement in the flow characteristics was noted. This resulted in a uniform mahogany and walnut grain throughout the cabinet. THERMALL preheating also permitted the use of standard material rather than a "special" formulation.

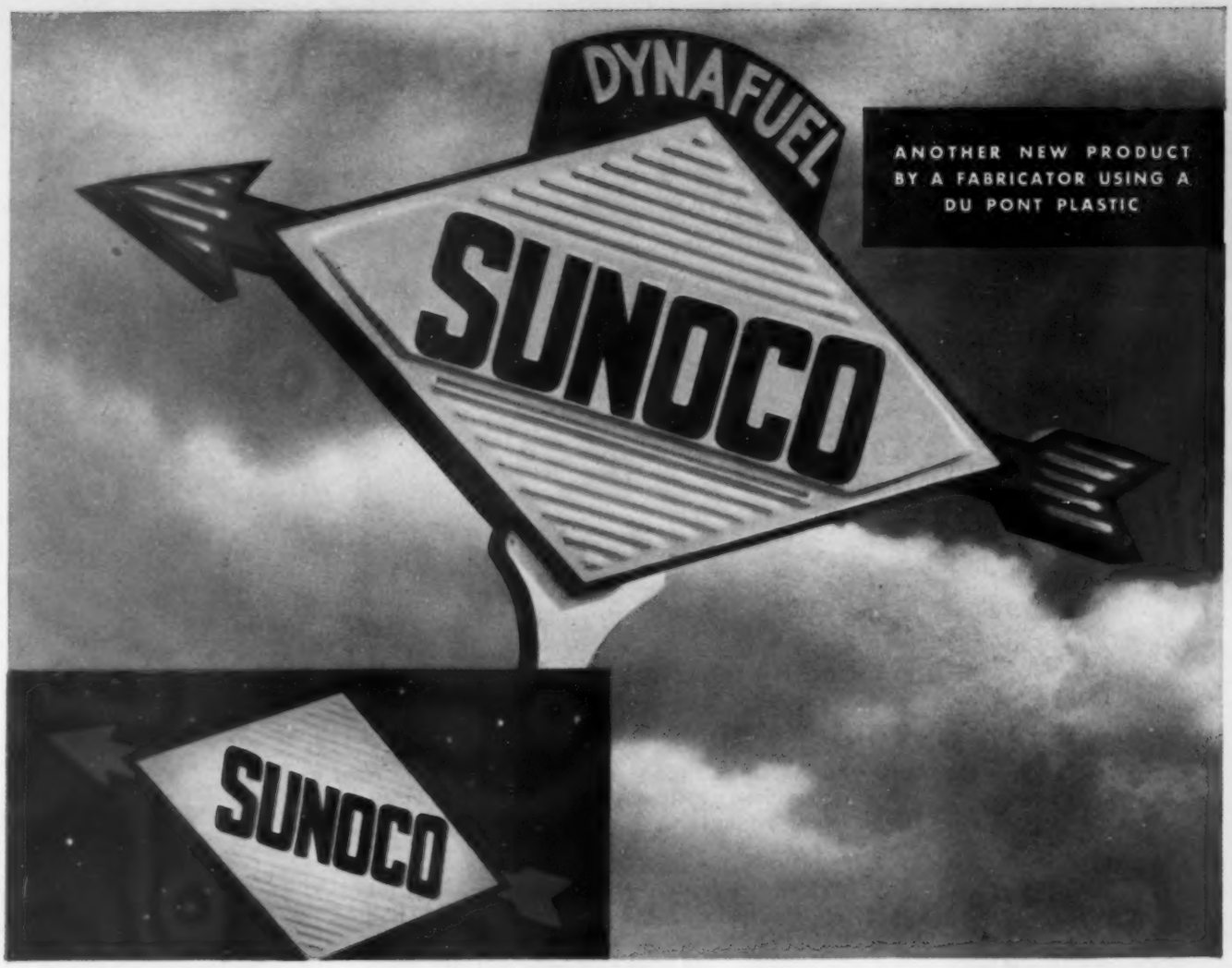
Another result in the use of the THERMALL unit was the improved overall surface finish which increases the sales appeal of the finished product."

It will pay you to look into the many THERMALL advantages that enable you to produce superior plastic moldings.

For information on the advantages, and uses or for demonstration any where in the world, write

W. T. LaROSE & ASSOCIATES, INC.
TROY, NEW YORK, U. S. A.

GUARANTEED PERFORMANCE . . . *or it doesn't cost you a cent!*



SOMETHING NEW IN SIGNS...DU PONT "LUCITE"

Distinctive by day... bright by night... built to last... colorful and light

NEARING COMPLETION, the lustrous sign face of "Lucite" shown above is getting a "touch-up" buffing. Readily machined and formed, blanked and cemented, "Lucite" can be used to produce unusual combinations and effects. Skilled fabricators throughout the country are taking advantage of the qualities of this plastic in the manufacture of hundreds of products.

Glowing like a huge light globe... bright and eye-catching, day or night ...here's an outdoor sign with "pulling" power. It's new! And it's *sign* news. It's made with faces of brightly colored, translucent "Lucite" acrylic resin.

"Lucite" captures sunlight and diffuses it over both surfaces of the sign. At night the whole sign glows *evenly*—lighted from within. In sunlight or darkness "Lucite" boosts visibility... and arrests attention.

More and more manufacturers are turning to "Lucite." Available in many colors or crystal clear, it is readily fabricated or molded. It resists weathering and does not shatter. It needs no painting, and maintenance is minimized.

Write for free booklet, describing "Lucite" and other Du Pont plastics.

Perhaps *you* will profit in developing a new product or improving an old one. E. I. du Pont de Nemours & Co., (Inc.), Plastics Department, Room 362, Arlington, N. J.

Sign faces fabricated by Ranger-Tennere, Inc., New York City; signs assembled by the Cutler Sign Company for the Sun Oil Company, both Philadelphia.

DU PONT
REG. U. S. PAT. OFF.
Plastics
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

BALL & JEWELL *Patent* **ROTARY CUTTERS**

are made in a wide range of sizes and types to meet any grinding requirement from small experimental purposes to large volume production.

- When the needs for granulating materials became apparent in the early stages of the Plastics Industry, Ball & Jewell already had suitable grinding equipment to meet these needs. We have kept pace with the Plastics Industry throughout its major phases of development since 1930.

BALL & JEWELL, INC.

20 Franklin Street Brooklyn, N. Y.

Since 1895, Manufacturers of Patent Rotary Cutters

Skillful molding does a sharp job!

These are parts which we molded for the Dexter Pencil Sharpener of the Spengler-Loomis Manufacturing Company, Chicago

This Dexter Pencil Sharpener is a striking example of our molding skill. Through craftsmanlike molding of four major parts—we transformed a prosaic, work-a-day item into an equally efficient object of handsome modern design.

This change was accomplished with full consideration of the hard usage given a pencil sharpener. To withstand this usage our engineers selected materials certain to be as hardy as they would be handsome.

Our molding techniques were geared for both swift and economical production. Wherever it was necessary, parts were automatically threaded in the molding—thus saving extra operations.

The same thoughtful selection of materials—the same sound engineering practices and molding skill can be applied to your products.

Remember—new eye appeal means added sales appeal. Let us help you put that profitable "plus" into your products today.

Write on your letterhead for the new Injection Molded and Extruded Plastics catalogue. Or, for detailed information about "MILLS PLASTIC" * pipe, tubing and fittings, write for circulars containing data and illustrations.

*Trademark Reg.

ELMER E. MILLS CORPORATION

INJECTION MOLDERS and EXTRUDERS of: Tenite, Lumarith, Plastacele, Fibestos, Lucite, Plexiglas, Nylon, Polystyrene, Styron, Lustron, Loalin, Vinylite, Geon, Plexene, Polyethylene, Cerex, Forticel, "MILLS PLASTIC"*, Saran, and other Thermoplastic Materials.

153 WEST HURON STREET • CHICAGO 10, ILLINOIS

1868-1948
CELLULOSE NITRATE
THE
VERSATILE
PLASTIC

Away back in 1868, cellulose nitrate was developed by treating cotton cellulose with nitric acid. This was probably the origin of the present plastics industry.

TOUGH
BUT ALSO RESILIENT

NIXON
C/N
CELLULOSE
NITRATE

One of the big dictionaries defines "resilience" as "the act or power of springing back to a former position or shape." All cellulose nitrates like NIXON C/N possess this property to a remarkable degree. NIXON C/N is tough and resilient in solid sections such as billiard balls, tool handles, mallet heads . . . it is also tough and resilient in thin sections, making it practical for such products as table tennis balls, dolls, pencils, fountain pens, etc. On golf club shafts and sleeves, for instance, NIXON C/N Tubing adds to the durability of the club. NIXON C/N, like other NIXON Cellulosics . . . NIXON C/A (Cellulose Acetate) and NIXON E/C (Ethyl Cellulose) are available in Sheets, Rods, Tubes, and Extruded Shapes. Nixon Molding Powders are available in Cellulose Acetate and Ethyl Cellulose.

NIXON NITRATION WORKS • NIXON • NEW JERSEY

Representatives: New York, Chicago, Detroit, St. Louis, Leominster • *Sales Agents:* NORTHWEST PLASTICS INDUSTRIES, Portland, Oregon; Seattle, Washington
Canadian Distributors: CRYSTAL GLASS AND PLASTICS, LTD., Toronto, Can. • *Export Distributors:* OMNI PRODUCTS CORP., 460 4th Ave., N. Y. 16, N. Y.

Splits the load in two!

Rollway Right-Angle-Loaded Bearings split all loads into pure thrust and pure radial . . . and carry each load at right angle to the roller axis. Hence, compound loads, oblique loads and their resultants do not bear upon one bearing alone.

This prevents wedging of rollers and pinch-out. Reduces roller end-rub, wear-back and rubbing friction. Cuts risk of shut-downs . . . cuts cost of maintenance and replacements.

ROLLWAY BEARING COMPANY, Inc.
SYRACUSE, N. Y.

ROLLWAY
RIGHT-ANGLE-LOADED
BEARINGS

OFFICES IN: PHILADELPHIA • BOSTON • PITTSBURGH • CLEVELAND
DETROIT • CHICAGO • MINNEAPOLIS • HOUSTON • LOS ANGELES

PLASTICS for INDUSTRY

CREATIVE CUSTOM MOLDING

Illustrated above is a Methyl Methacrylate advertising sign made for Price Brothers, Inc., display and sign Mfgrs. of Chicago for the Jos. Schlitz Brewing Company of Milwaukee, Wis.

The deep lettering in the word "Schlitz" (measuring 5'16" deep) is filled with a translucent cream color; the center panel is dark brown in color. The copy of the lower part of the sign is silk screened in red color. A specially developed lacquer is applied around the border to simulate a sand blasted finish. Over a pound of material is required for the plastic casting.

Cruver's engineers collaborated with the customer in the development of this distinctive sign.

CRUVER CHICAGO

52nd Year in Plastics . .

Cruver

MANUFACTURING COMPANY

2456 W. Jackson Blvd., Chicago, Ill., Seeley 1300

New York – 2 W. 46th St. • Wisconsin 7-8847

THEY INSIST ON THE BEST!

Leaders of industry have reached their position through years of specialized effort . . . through constant trial and marked preference for high dependable production at low-per-unit cost.

Such leaders, through long years of experience, well know the many advantages of custom-molded parts and housings by Insulation . . . the accuracy and precision, strength and durability of each Insulation-molded unit.

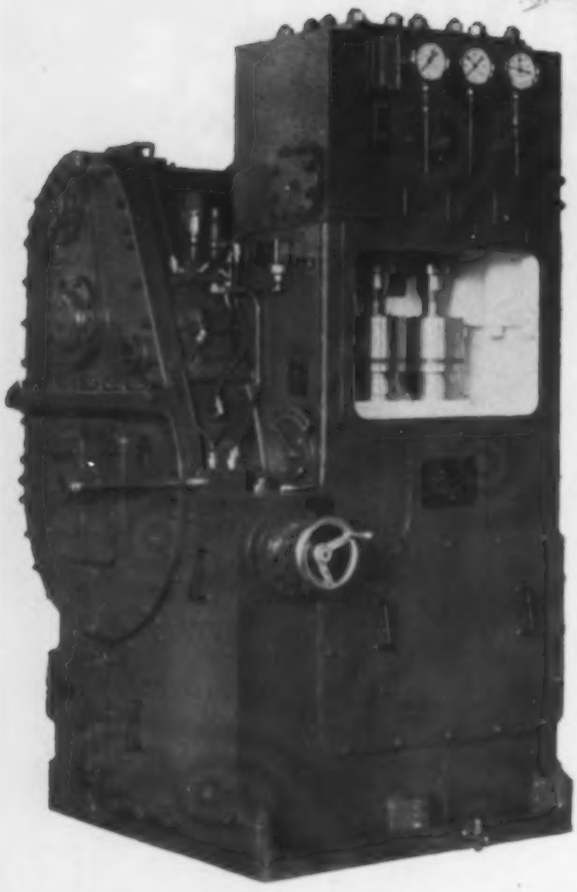
Placing your custom-molding problems before the Insulation engineering staff invites immediate practical recommendations!

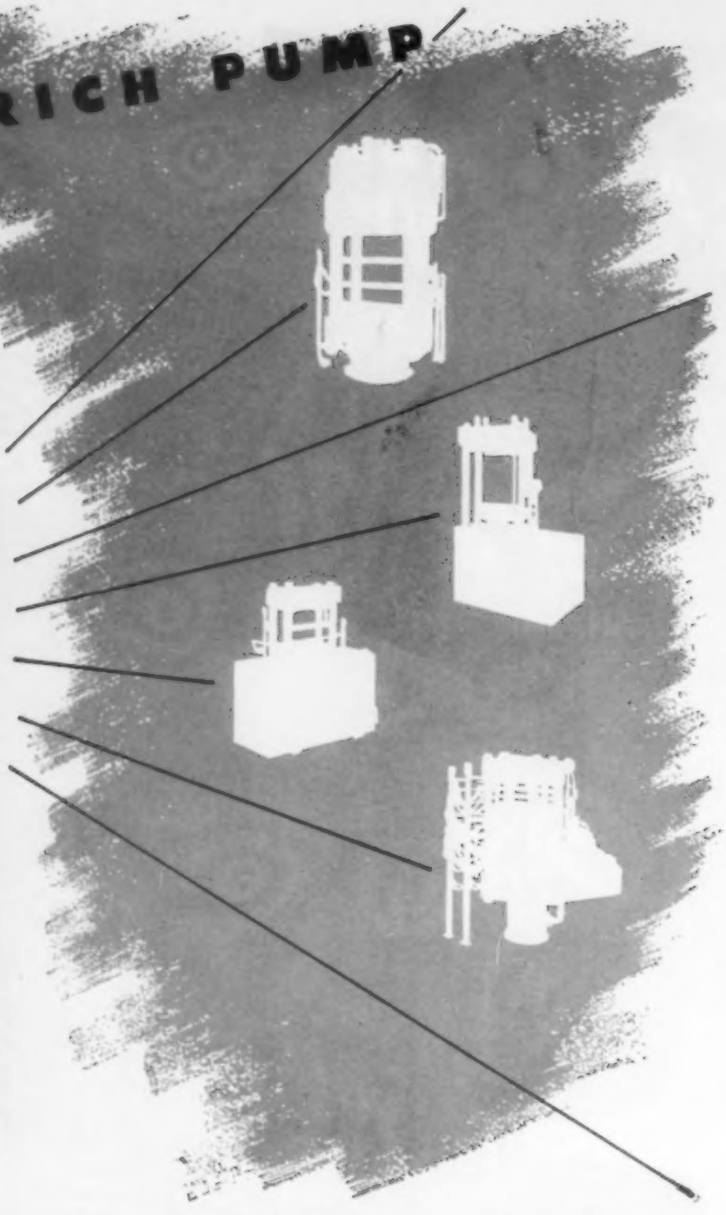
INSULATION MANUFACTURING CO., INC.

Custom Molders of Plastics for Industry

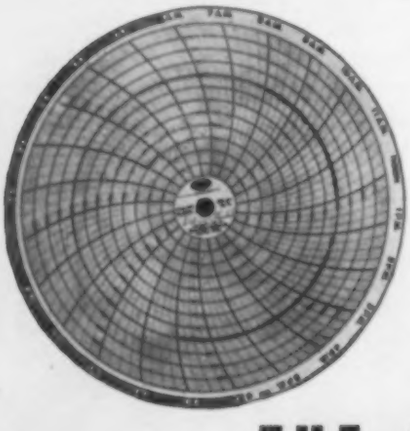
13 New York Avenue • Brooklyn 16, N. Y.

USE *One* ALDRICH PUMP





For All Your Plastic Molding Presses



With one ALDRICH-GROFF "POWR-SAVR" PUMP, you can provide uniform hydraulic pressures for all your plastic molding presses and obtain the higher efficiency of a centralized hydraulic system at the same time.

The ALDRICH-GROFF "POWR-SAVR", a variable stroke, constant speed, variable capacity pump, will handle any free-flowing liquid—can be automatically controlled to provide stepless, straight-line variation from zero to rated maximum output. Working pressures up to 15,000 psi can be maintained and variance will not exceed 5% of that desired.

Centralize your system—you get compactness, quick accessibility, easy maintenance and greater economy. Write for technical details to—

THE ALDRICH PUMP COMPANY

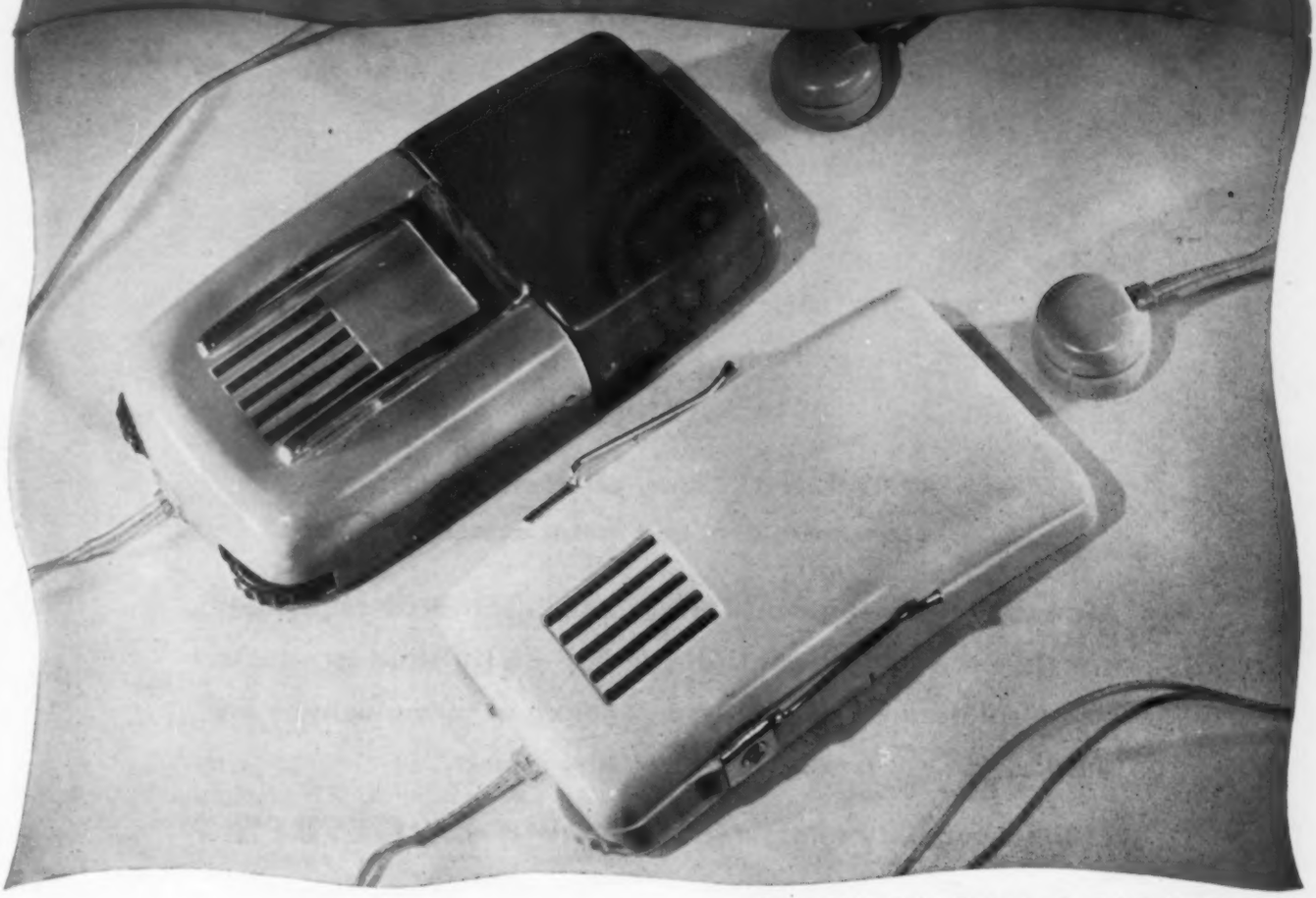
6 GORDON STREET, ALLENTOWN, PA.

ALDRICH

Representatives: Birmingham • Belivar, N. Y. • Boston • Chicago • Cincinnati • Cleveland • Denver Detroit • Duluth • Houston • Jacksonville • Los Angeles • New York • Omaha • Philadelphia • Pittsburgh Portland, Ore. • Richmond, Va. • Spokane, Wash. • Syracuse • St. Louis • San Francisco • Seattle • Tulsa

ALDRICH, THE FIRST NAME IN VARIABLE CAPACITY PUMPS

Ethyl sounds good to Western Electric



Parts molded by Berkely Engineering Co., Erie Resistor Corp., and Watertown Mfg. Co., from ethyl cellulose supplied by Chemaco Corp.

The choice of ethyl cellulose plastic for the housings of these new hearing aids no doubt has helped make them known as "Western Electric's greatest contribution to better hearing."

Lightweight compactness was achieved by molding with ethyl cellulose, which is extremely tough—even in thin wall sections. Dimensional stability, which assures a permanently tight fit of integral parts, and permanent color and beauty of finish are other properties of ethyl cellulose that helped in the design of these modern hearing aids.

In short, here is another outstanding example of the unique *combination* of properties which ethyl cellulose plastic offers alert manufacturers in designing and merchandising plastic products.

Hercules does not make cellulosic plastics or molding powder; however, we will be glad to send you helpful technical literature on the Hercules materials from which they are made.

HERCULES POWDER COMPANY
INCORPORATED
916 Market Street, Wilmington 99, Delaware

CPB-4

Save and Sell with Cellulosic Plastics

CELLULOSE ACETATE • ETHYL CELLULOSE • NITROCELLULOSE

Maybe We've Got the Combination to Your Moulded Plastic Job

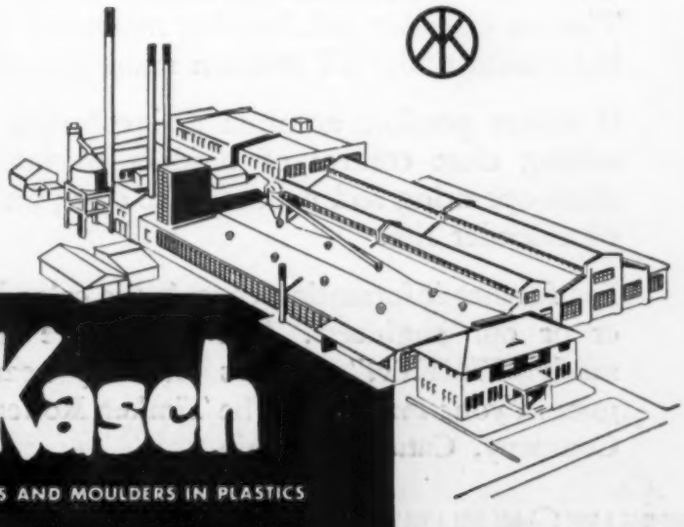
THERE'S no "Open Sesame" to a new moulding problem. Getting results takes the same old patient hunt for the proper combination—in every function from design and engineering right through mould-making, moulding, finishing and the rest.

But there's this bit of magic that still works. Knowing these problems . . . having solved similar puzzles before . . . experienced moulders are liable to get there quicker. And with methods that have been tried and proved.

So look a little deeper than the price tag on your moulder's bid. Experience like ours — a reputation like ours — experienced personnel and a complete, self-integrated plant like ours—these things mean we'll quote a fair price on a job you can depend on quality-wise, cost-wise and delivery-wise.

We're interested in your business, if either compression, transfer or plunger moulding will do the job. May we send a sales engineer?

Kurz-Kasch, Inc., 1415 S. Broadway, Dayton 1, Ohio
BRANCH SALES OFFICES: New York, *Lexington 2-6677* Chicago, *Harrison 5473* • Detroit, *Randolph 5214* Los Angeles, *Prospect 7503* • Dallas, *Lakeside 1022* St. Louis, *Rosedale 3542* • Toronto, Canada, *Adelaide 1377*. **EXPORT OFFICES:** 89 Broad Street, New York City, *Bowling Green 9-7751*.



Kurz-Kasch

FOR OVER 31 YEARS PLANNERS AND MOULDERS IN PLASTICS

YOU *Specify* THE TOLERANCE—

TIMKEN® BEARINGS WILL HOLD IT!

The precision demands in plastic calenders today are more exacting than ever before, but Timken Balanced Proportion Bearings on calender rolls are not only meeting, but anticipating them.

Whatever the calendering tolerances specified for plastic sheets or film, the Timken calender roll bearing mounting shown above has proved its ability to hold them under all modern manufacturing conditions.

It makes possible accurate and constant gap setting between rolls with resulting close control of product thickness; minimum operating and maintenance costs; and extended calender life.

For further information consult the calender builder or our engineers. And make sure the trademark "TIMKEN" appears on every bearing that goes in your machines. The Timken Roller Bearing Company, Canton 6, Ohio.

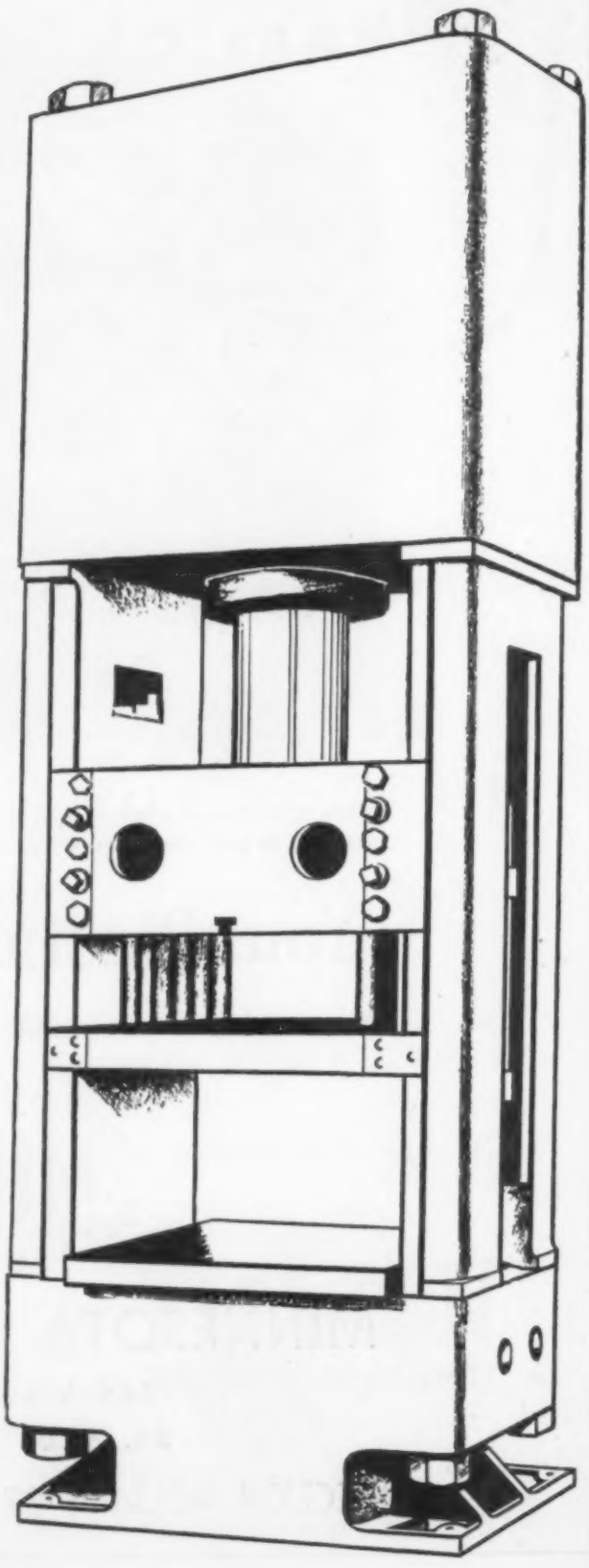
TIMKEN
TRADE MARK REG. U.S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ⊖ AND THRUST →⊖← LOADS OR ANY COMBINATION ✳

BETHLEHEM HYDRAULIC PRESSES

for

PLASTICS
FIBER BOARD
WALL BOARD
VULCANIZING
METAL-FORMING



Built to your order in hot-plate, molding, and metal-working types. With or without self-contained or separate hydraulic power systems. Let one of our engineers talk over your specifications with you.

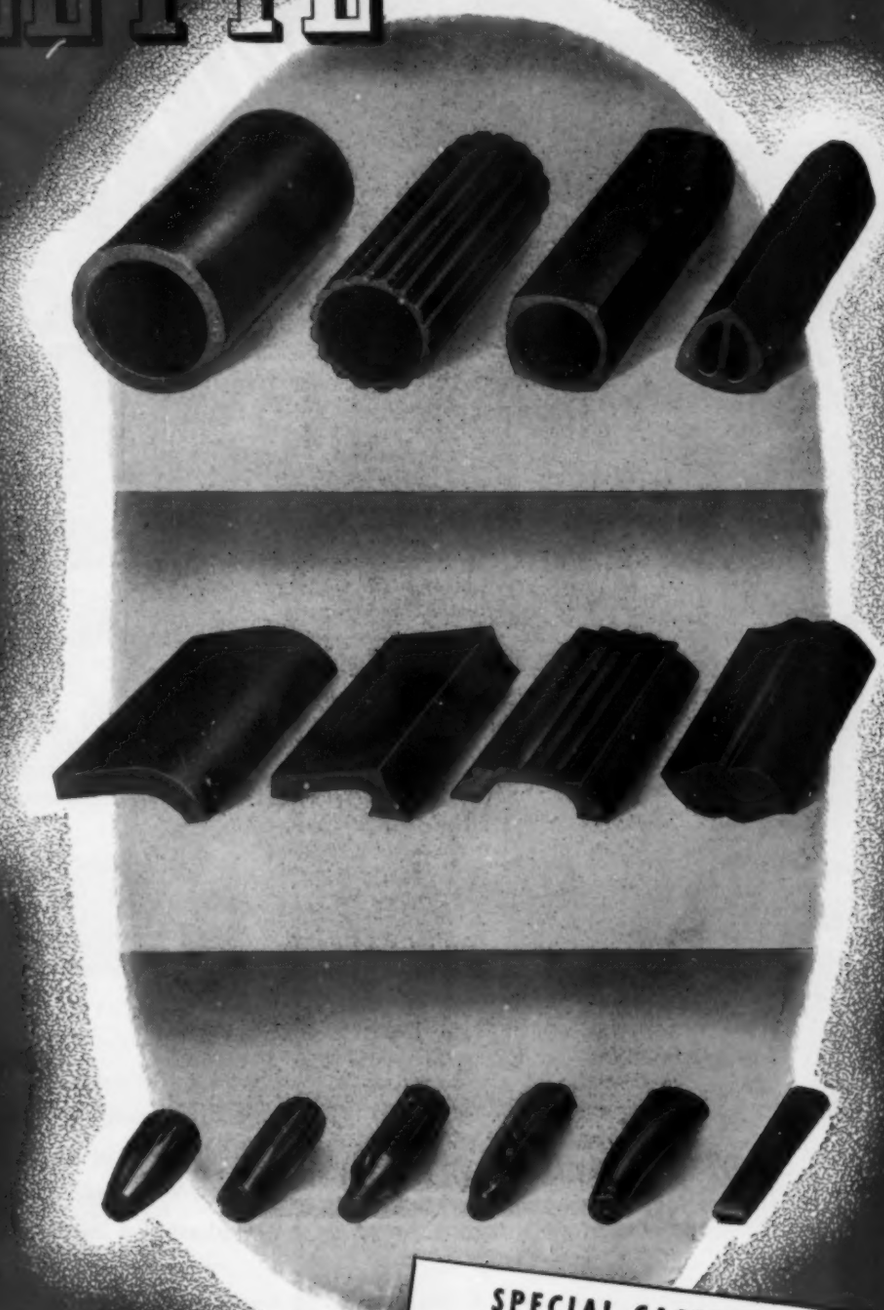
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

A CAST PHENOLIC RESIN OF EXCEPTIONAL QUALITIES

MARBLETTE



Outstanding among plastics, Marblette has a jewel-like depth and a complete color range which duplicates the appearance of precious stones, tortoise shell and ivory.

Its almost infinite variety of colors is available in transparent, translucent, opaque, or in mottled effects. Marblette also comes in a water clear form known as "Crystle" in a wide choice of colors.

Marblette's machining characteristics, resistance to oils and acids, non-inflammability and exciting beauty make it ideal for countless manufacturing needs.

MARBLETTE will help plan your world of tomorrow. The Marblette staff of engineers offers its services to help with your manufacturing problems. Write to us outlining your needs.

SPECIAL CASTINGS

Marblette is supplied in sheets, rods, tubes, and special castings such as cutlery handles, kitchen utensil handles, pipe stems, cigarette holders, clock cases, automotive trimmings, jewelry items, buckles, etc. Special shapes made to customer's specifications can be supplied provided draft is all one way.

THE MARBLETTE CORPORATION

Manufacturers of Phenolic Resins since 1929

37-21 THIRTIETH ST., LONG ISLAND CITY 1, N. Y.

NOW IT'S THE *Zenette* MOLDED BY... Santay

Soft, rich, *appealing beauty* in every classic line . . that's Zenith Radio Corporation's new "Zenette" . . a personal, portable radio, injection molded by SANTAY. Shown above are outside and inside views as well as details of the three parts we molded. Here again is graphic evidence of another of a long series of superlative tooling achievements brought to a successful conclusion by SANTAY.

The "Zenette" is generally considered one of the best designed sets of its kind by the radio industry. Close examination reveals the unusual skill, experience and resourcefulness of SANTAY Craftsmen in designing, tooling, molding and finishing. Make it a point to *see* the rare beauty and unusual precision of this remarkable radio the first chance you get. One look will tell you more than a thousand words, that here indeed is a masterpiece of modern injection molding.

INJECTION MOLDING AND METAL STAMPING • ELECTRO-MECHANICAL ASSEMBLIES

SANTAY CORPORATION, 355 NORTH CRAWFORD AVE., CHICAGO 24, ILLINOIS

REPRESENTATIVES: BURTON SALES CO., BRISBANE BLDG., BUFFALO 3, N.Y. • QUEISSER BROS., 110 E. 9th ST., INDIANAPOLIS 2, IND. • PAUL W. SEILER 7779 CORTLAND AVENUE, DETROIT 4, MICHIGAN • C. E. WHITE & CO., BULKLEY BLDG., CLEVELAND 15, OHIO • WILLIAM S. RICHARDS COMPANY, 4903 DELMAR BOULEVARD, ST. LOUIS 8, MISSOURI.

MACHINE AGITATORS IN CARLOAD LOTS?"

Maytag agitators are molded on one of General American's 2000-ton compression presses which has a 71" x 74" platen area. This press, one of the largest in the industry, produces four agitators at one stroke. The dies were especially built by General American for equally distributed, even pressure over all four dies, and to eliminate knockouts. To speed production and reduce costs, all secondary jobs are done on equipment set as close as possible to the press.

(A) Pre-forming equipment was adapted by General American engineers to form an extremely flacculant material into large pellets for faster molding.

(B) *To control part shrinkage during cooling period, General American designed a special shrink fixture. Vertical inaccuracy is held to close tolerances of .002".*

(C) This is one of the finishing operations which provide gloss and smoothness that will be gentle on clothes. Before buffing and polishing, this agitator was automatically de-flashed on a fixture developed by General American . . . another time-saving production technique.

Here's How to Get Your Plastic Parts at Close Tolerances—on Schedule

General American can help you right from the preliminary design stage. Our designers and engineers will work with you in the selection of the correct plastic for the job . . . will give you unbiased advice on the right method of molding . . . in considering design limitations . . . in estimating production costs.

General American will produce your part or product on the most modern molding machinery available—with precision accuracy that guarantees uniform maintenance of dimensional tolerances. Precision die and mold-making equipment and batteries of high-speed molding machines ranging from 2 to 32-oz. injection presses and 100 to 2000-ton compression presses offer you quality work at the lowest possible cost.

Write or send blueprint for quotation and suggestions at no obligation.

PLASTICS DIVISION

TRADEMARK

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South LaSalle Street, Chicago 90, Illinois

New York City: 10 East 49th Street

Los Angeles: Richfield Building

YOU CAN LOWER YOUR BREAK-EVEN POINT WITH ELMES AIR-POWERED HYDRAULIC PRESSES

Plastics molders are bringing down "break-even points". . . raising efficiency . . . *cutting costs to new lows* with Elmes air-powered hydraulic presses. For nearly a century, Elmes research and production facilities have been dedicated to progress. Elmes was *first to use air* for the quick-closing of small manual presses. And, from that experience, now has come the Elmes Hydrolair with *full power-operation.* Here's how air power pays off.

Air-powered Elmes hydraulic presses have neither pumps nor motors. That means *savings in first cost;* smaller size; lighter weight. They are easy to install, *and to move*—no floor-load or foundation worries. Power is taken entirely from the regular shop air line, yet air requirements are *negligible.* Air-powered Elmes presses are fast, quiet, simple, easy to use—consume no power when closed. They're the profit way to *efficient* quality molding.

ENGINEERED BY ELMES

Good Hydraulic Production Equipment Since 1851

FREE BULLETIN NO. 5200 GIVES FULL DETAILS OF ELMES HYDRAULIC EQUIPMENT FOR PLASTICS MOLDERS • ASK FOR IT.

SMALL-PRODUCTION PRESSES. Air-actuated quick-closing. Fastest of all manual presses. Built to Elmes "big press" standards of precision and performance. For pre-checking new molds and dies—testing specimens—establishing heat, pressure, and curing time—actual production. Bench-types to 30 tons. Also with full-manual operation.

ELMES HYDROLAIRS. Full *power-operated* hydraulic presses. Take their power *entirely* from the shop air line. For molding plastics and rubber, laminating, and many other pressure purposes. Fast, durable, compact—in bench types to 30 tons; floor types to 50 tons. Automatic push-button time-cycle control optional on 50-ton press.

ELMES ENGINEERING WORKS *of* AMERICAN STEEL FOUNDRIES, 225 N. Morgan St., Chicago 7, Ill.

Distributors in Principal Industrial Centers

METAL-WORKING PRESSES · PLASTIC-MOLDING PRESSES · EXTRUSION PRESSES · PUMPS · ACCUMULATORS · VALVES · ACCESSORIES

EVEN A *Calf* WOULD BE JEALOUS!

● This lovely plastic for luggage, handbags and upholstery is just one example for you of *Resproid's* versatility. Manufactured in a wide variety of lovely styles, this modern vinyl plastic is just as pretty, practical and profitable in shower curtains, aprons, waterproof garments, belts — a range of products as limitless as your own imagination.

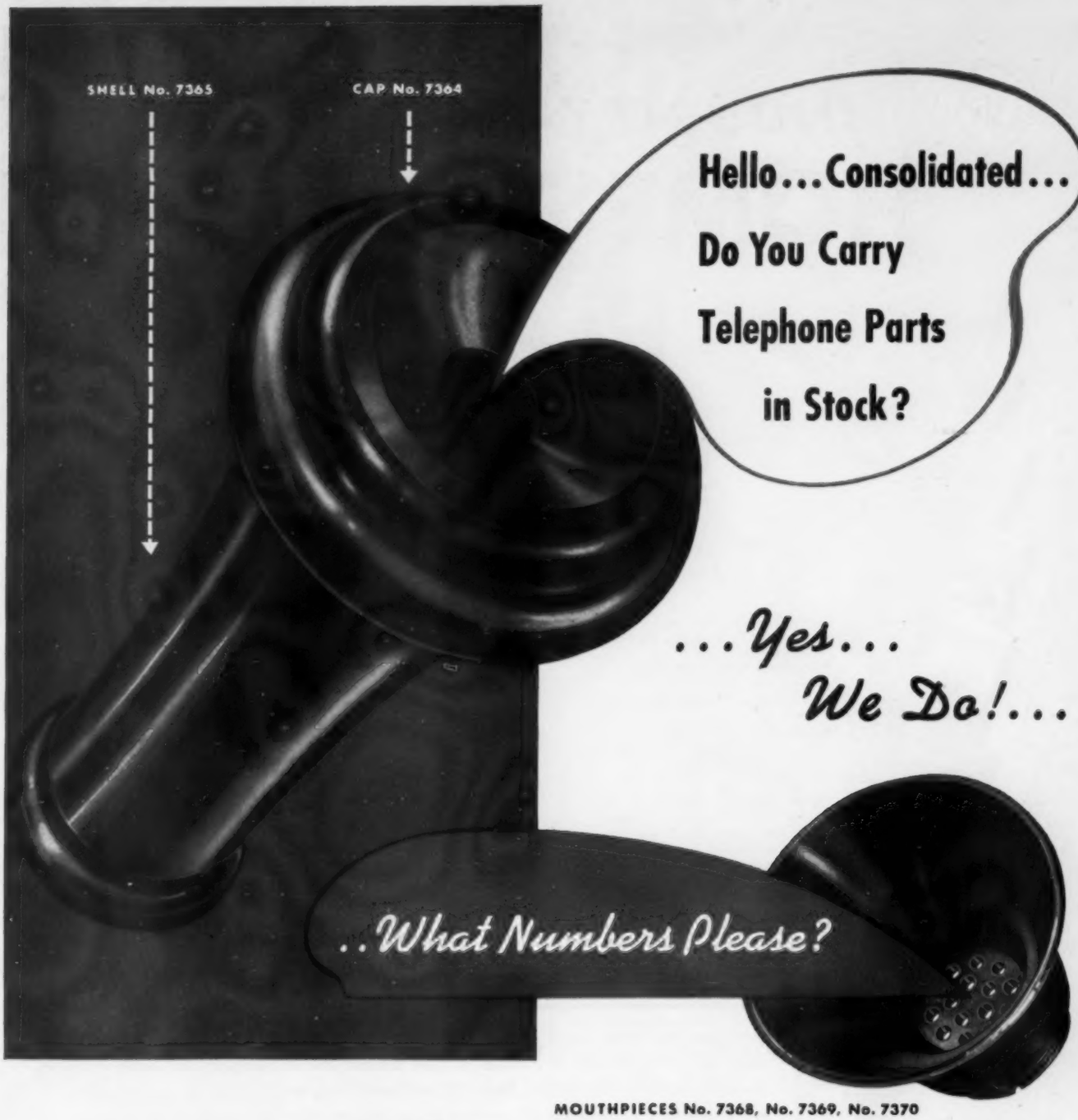
Resproid comes in a rainbow of jewel-like colors and pastel shades—colors that are practical anywhere because *Resproid* can be cleaned in seconds with just a damp cloth. And *Resproid* is almost indestructible in everyday use—resistant to cracking, fading, scuffing and abrasion—to perspiration, acids, alkalies and oils.

Whether you're looking for new products to make or new ways to improve your present line, *Resproid* offers you a whale of an opportunity. Investigate *Resproid's* profit possibilities now.

● *Manufactured in a modern, fully equipped plant under strict laboratory control,* Resproid *is compounded of high molecular weight resins which can be processed only on the latest plastic equipment and which give greatly increased wearing qualities. Insist on the name* Resproid *whenever you buy plastics.*

Guaranteed by Good Housekeeping

Respro INC.
CRANSTON 10, RHODE ISLAND



MOUTHPIECES No. 7368, No. 7369, No. 7370

Consolidated
MOLDED PRODUCTS Corporation
309 CHERRY STREET,
SCRANTON 2, PA.

"Your Blueprint in Plastic"

For years, Consolidated has been a dependable source for various types of telephone parts. As a result of recent new production-mold-construction, we now precision-process these components of high-impact-strength black Phenolic... are therefore in a position to furnish you finished parts from stock — immediately. Samples and details awaiting your request. Inquiries invited!

PRODUCT DEVELOPMENT • MOLD DESIGN • MOLD CONSTRUCTION • PLUNGER MOLDING • TRANSFER MOLDING • INJECTION MOLDING • COMPRESSION MOLDING

Branches: NEW YORK, *1790 Broadway* • CHICAGO, *549 W. Randolph St.* • DETROIT, *550 Maccabees Bldg.* • CLEVELAND, *4614 Prospect Av.* • BRIDGEPORT, *211 State Street.*

Smash Hit with *Storkline* Younger Set!

Where will the furniture industry use KYS-ITE next?

EYE OPENER FOR ENGINEERS

The underside of this KYS-ITE Chair Tray is worth a second look. Note the coring out, the thin wall sections, the construction details where hardware is attached to the tray. Self-tapping screws are spun in for rapid, permanent assembly. It's another KYS-ITE piece that gives engineers a new conception of what Keyes can do—in custom molded jobs impossible with wood, impractical with other materials.

Doting parents are very particular customers. So KYS-ITE became the choice for the new high chair tray molded by Keyes for the Storkline Furniture Corporation, Chicago, Illinois. And how that helps in MAKING SALES!

Mothers smile approvingly over this handsome plastics tray. Rough and ready handling can't mar or splinter it. Fruit juices or other spilled foods won't stain it or run over the molded rim. And it's sanitary as a baby's bottle! Easily cleaned, unaffected by soap, boiling water or antiseptic solutions.

Maybe you're looking for *other* advantages in the product you're designing or manufacturing? Fine! Just remember, no other type of material offers KYS-ITE's combination . . . durability with beauty (choice of colors and rich grained effects); strength without weight; non-conductivity; good dielectric properties.

Our experience in custom molding to specifications is at your service . . . on furniture or anything else. Why not get in touch with us soon?

KEYES FIBRE COMPANY
420 Lexington Avenue
New York 17, New York
Plant at Waterville, Maine

KEYES
MOLDED PRODUCTS

KYS-ITE

(Reg. U. S. Pat. Off.)

Preformed Plastic Combining Long-Fibered Wood Pulp and Synthetic Resin

Men working together, for production, can give America what it needs: more and finer products ...greater *values* ... better standards of living... for all! Slow-downs or forced idleness deprive everyone of the gains industry can offer only through more production.

Only through cooperation for production can America benefit by the great technological advances of recent years. Modern MOSINEE papers, for instance, custom-made to meet specific requirements, are helping to improve products, slash costs, raise standards of living.

MOSINEE paper technicians are equipped to create paper with scientifically controlled chemical and physical characteristics to improve many products and processes. Call MOSINEE!

MOSINEE PAPER MILLS CO. MOSINEE, WISCONSIN

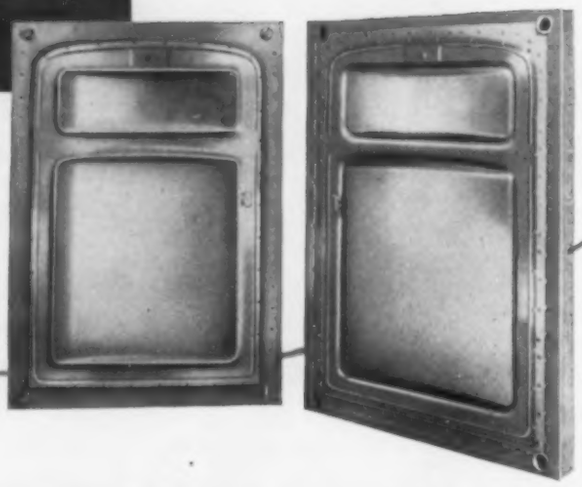
MOSINEE PAPER MILLS COMPANY

MOSINEE • WISCONSIN

Essential Paper Makers

Please address your letter Dept. "A"

Craftsmanship



ALLIED WITH PLASTICS PRODUCTION

SPECIAL COLD FORGED PARTS • STANDARD CAP SCREWS • HARDENED AND PRECISION GROUND PARTS • SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES • STEAM-HEATED PLASTIC MOLDS • SPECIAL PRODUCTION TOOLS • R-B INTERCHANGEABLE PUNCHES AND DIES • DIE MAKERS' SUPPLIES

ALLIED is serving the plastics industry with men thoroughly skilled in the production of steam-heated plastic molds. Every specification for accuracy of form and for fine surface finish is met exactly. It is an Allied service that has developed with the industry—that is in step with the requirements of the industry today.

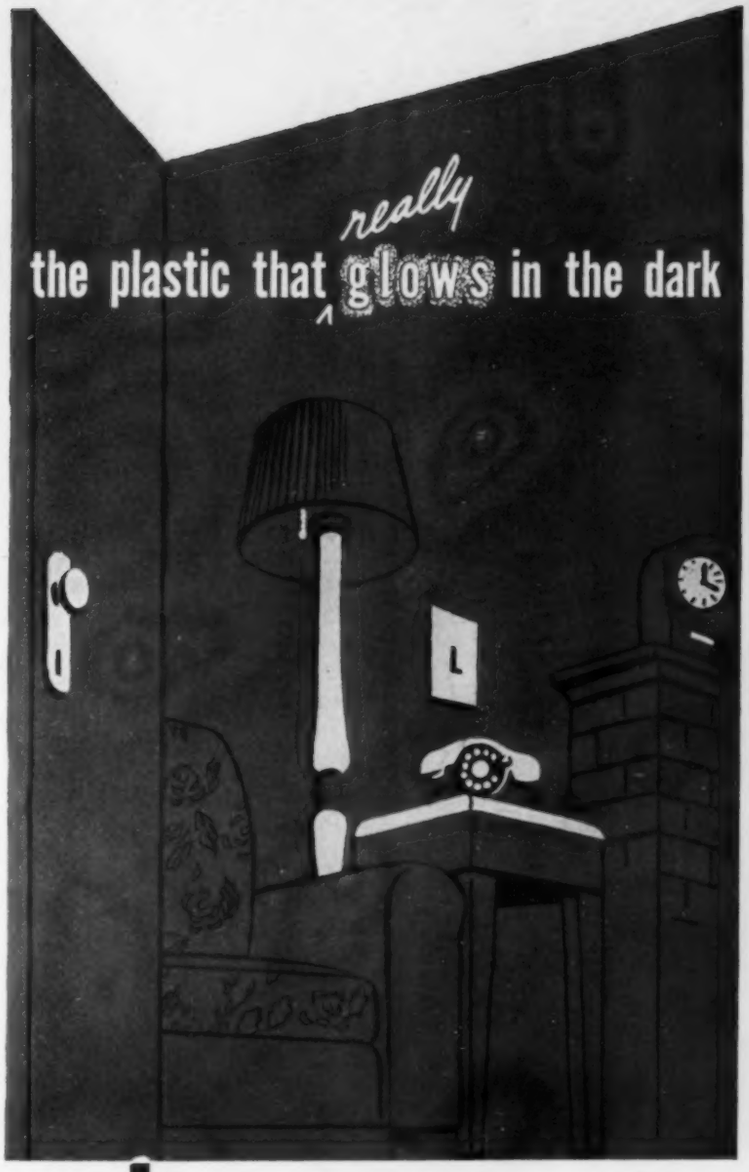
ALLIED PRODUCTS CORPORATION

DEPARTMENT 2-P

4622 LAWTON AVENUE DETROIT 8, MICHIGAN

PRECISION · EXPERIENCE · ALLIED CORPORATION PRODUCTS · DEPENDABILITY

. . . and now PAULITE



PAULITE is the amazing new injection molding compound that glows brilliantly in the dark. Produced by a special new method from an exclusive formula, PAULITE provides *maximum initial glow* after activation by light, and a *bright blue afterglow which persists 10 or more hours in absolute darkness!*

It's easy to use

PAULITE requires no additional mechanical working prior to molding—its ⅛" or ¼" *granules or pellets* are ready for immediate use. Furthermore, PAULITE needs no special treatment during the molding process; it can be handled like any other molding compound. Best of all, you can get PAULITE in special formulations possessing the specific physical properties you need for the item to be molded.

Many profitable applications

Uses for this important new plastic material are as broad as merchandising ingenuity. Lighting fixtures, lamps, flashlights, indicators, dials, theatre fixtures, appliances, household utensils, dashboard accessories, signs and markers . . . these merely suggest the variety of applications and the scope of the market.

THE PREMIERE IN LUMINESCENT PLASTICS
PAULITE
REG. U.S. PAT. OFF.

New colors coming

As a result of newly completed research, in addition to blue, you will shortly be able to get PAULITE in such brilliant and beautiful luminescent colors as yellow, green, orange and violet.

Luminescent
PLASTICS CORPORATION
201 N. WELLS STREET CHICAGO 1, ILL.

MAIL THIS COUPON FOR FULL DETAILS

LUMINESCENT PLASTICS CORP.
201 N. Wells Street
Chicago 1, Ill.

Gentlemen:

We're interested in PAULITE, the plastic that really glows in the dark, for molding the following items.....

.....

Please send us detailed information on PAULITE'S physical properties and colors. Include data on prices and delivery dates.

Name.....

Firm.....

Address.....

Now a new style ice helmet

...and it may suggest a new use of latex to you

★ This new ice helmet will soon be used in hospitals throughout the country. It fits the head as no helmet ever has before—is light but strong... cannot become overfilled and will have actual contact at all points, thereby aiding therapy.

A special American Anode latex made this improved helmet possible. Through the American Anode dip process, interior segmented construction designed to avert either bulge or collapse has been achieved for the first time. Yet it is but another of the many industrial uses for American Anode latices and mixes.

Toys and meteorological balloons, metal coatings, catheters and camera bellows, leather replacement and impregnant for paper and textiles...all these uses American Anode mixes have already been put to. No one knows how many more there will be. Perhaps Anode can help you improve present products or develop new ones.

Latices and compounded mixes of GEON, HYCAR, neoprene, crude rubber and GR-S are available. For more information about these modern materials and *methods of using them*—please write Department AF-1, American Anode Inc., 60 Cherry Street, Akron, Ohio.

AMERICAN ANODE

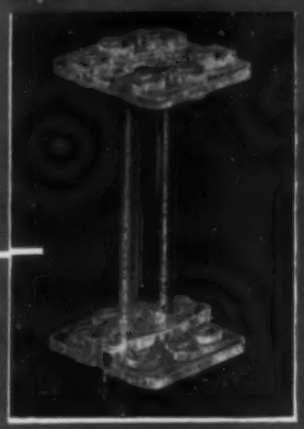
CRUDE AND AMERICAN RUBBER LATICES, WATER CEMENTS AND SUSPENSIONS

ERIE RESISTOR

Custom Molded Plastics

How *Precise* is Precision?

ERIE RESISTOR
CUSTOM MOLDED
Plastics
REVISE PREVIOUS
CONCEPTS



it's another . . .
ERIE RESISTOR
CUSTOM MOLDED JOB

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The illustrations give only a hint of the versatile facilities of Erie Resistor for the production of custom molded plastics. A large part of that versatility lies in the ingenuity of an experienced engineering staff which is kept constantly on its toes by getting assignments that have been pronounced "impossible" by less experienced or less skillful operators. In fact such experiences have been so frequent that it has become a byword in the trade that "You don't know it can't be done until you have tried Erie Resistor."

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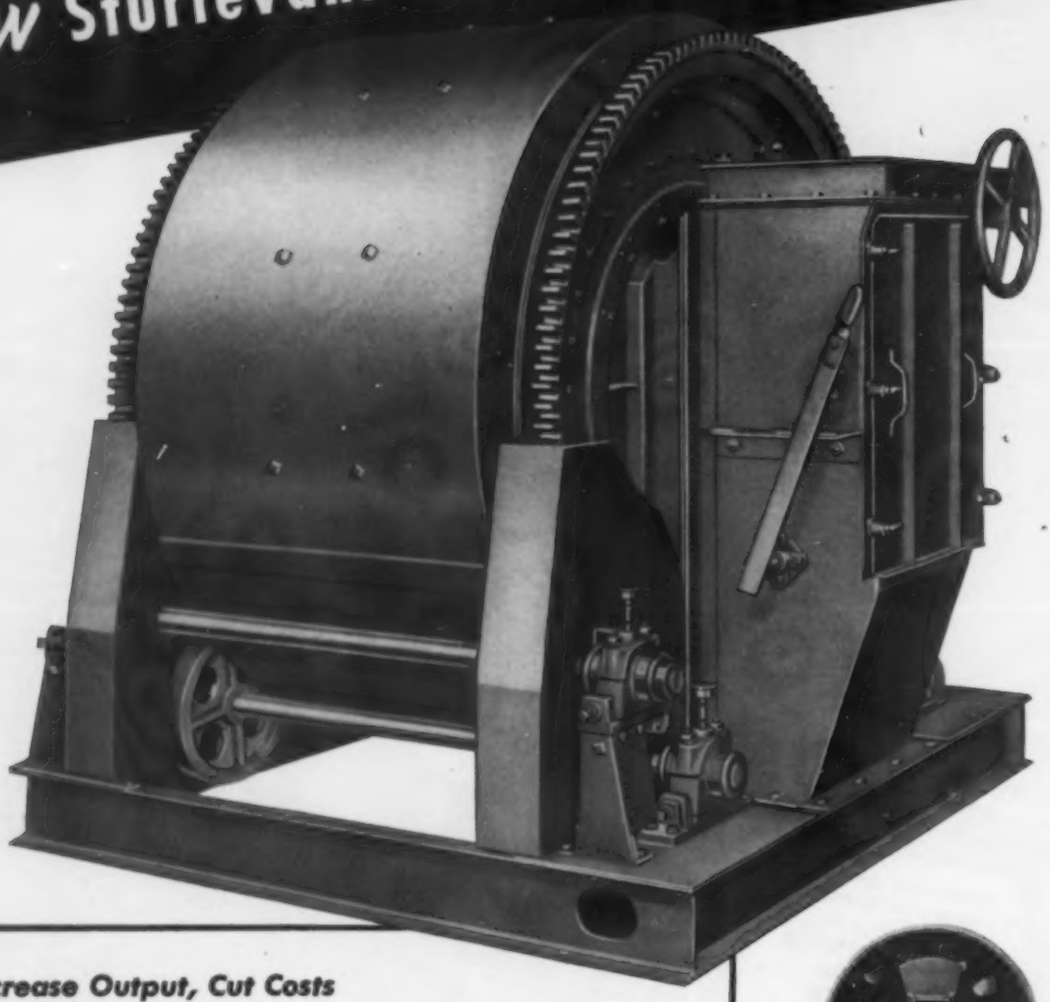
Plastics Division

ERIE RESISTOR CORP., ERIE, PA.

LONDON, ENGLAND • • TORONTO, CANADA

New Sturtevant Dry-Batch Mixers



★ *Increase Output, Cut Costs*

★ *4-Way Mixing Action Assures Thorough Blends*

★ *Open-Door Accessibility Permits Fast, Easy Cleaning*

The new, improved Sturtevant dry-batch mixers thoroughly and efficiently mix two or more substances into a homogenous and inseparable whole, every part of which has the same analysis. The 4-way mixing action does a more rapid mixing job than other machines. The single receiving and discharging opening permits tight sealing during the mixing process. Open-door accessibility permits thorough cleaning.

The mixer is simple and easy to operate . . . hand lever controls both receiving and discharging. These efficient Sturtevant dry-batch mixers are available in five sizes with mixing capacities from 7½ tons to 75 tons per hour. Write for bulletin and complete information today.

Receiving — The ingredients to be mixed enter the mixing chamber of the drum through a chute. Note scoops which carry up and dump the ingredients as the drum rotates.

Discharging — By simply throwing a lever, the inlet is closed and the mixer is in discharging position. The completely mixed materials drop off the lifting scoops and discharge through chute without segregation of ingredients.

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MILL COMPANY
110 Clayton Street, Boston 22, Mass.

Designers & Manufacturers of

CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

PRODUCT	COMPOSITION	B.P. @5mm	SP. GR. @20/20°C	LOW-TEMP. PERFORMANCE	COMPATIBILITY VINYLS	COMPATIBILITY CELLULOSE ESTERS*	COMPATIBILITY SYNTHETIC RUBBERS	OTHER CHARACTERISTICS
"PLASTOLEIN" X-55	diethylene-glycol dipelargonate	229°C	.9640	Excellent	Good	Good	Excellent	"Plastolein" X-55 has good color (light straw), moisture resistance and working properties.
"PLASTOLEIN" X-58	dioctyl azelate	237°C	.9184	Excellent	Excellent	Good*	Excellent	These two water-white esters of azelaic acid are recommended particularly for transparent, clear films. Impart excellent tear strength. Suggested also for Organosols & Plastisols. Economical . . . less plasticizer per unit of resin.
"PLASTOLEIN" X-508	dihexyl azelate	230°C	.9319	Excellent	Excellent	Good*	Excellent	
						*Except for cellulose acetate		
"PLASTOLEIN" X-548	A complex fatty ester	Decom-poses at B.P.	.9546	Fair	Fair	Ethyl Cellulose Only	Excellent	A low-cost plasticizer, light yellow in color, X-548 was developed especially for Buna N mixes. However, when blended with small amounts of primary plasticizer, it is completely compatible with vinyls giving good performance.
"PLASTOLEIN" X-545	Tetrahydro furfuryl oleate	240°C	.9279	Excellent	Good	Good	Excellent	Emery's X-545 exhibits improved odor, color and color stability for this type of plasticizer. Outstanding for internal lubrication.

LOW-MOLECULAR WEIGHT ALIPHATIC ACIDS

PRODUCT	FORMULA	COMB. WT.	ACID VALUE	SP. GR.	SOLUBILITY-TYPICAL REACTIONS	USES
"PLASTOLEIN" L-110	$C_7H_{14}(COOH)_2$ Azelaic Acid	93 to 97	575 to 600	1.038 @110°C	Azelaic acid is a buff colored solid, insoluble in cold but infinitely soluble in hot water, in alcohol and polar solvents. Reactions are typical of di-basic acids.	Azelaic forms soft alkyds. Recommended for manufacture of plasticizing resins, its esters also are excellent plasticizers.
"PLASTOLEIN" L-114	$C_8H_{17}COOH$ Pelargonic Acid	145 to 150	375 to 385	.923 @15.5/15.5°C	A mono-basic acid, very slightly soluble in water but soluble in alcohol and most organic solvents. Forms salts, esters, acid halides, amides, etc. Also available in a purified form, L-288, for perfumes.	Esters of pelargonic acid make good plasticizers while the acid can be used in modification of alkyds, and in the manufacture of essential oils, pharmaceuticals, etc. Recommended wherever short chain saturated aliphatic acids are required.

SPECIAL FATTY ACIDS

PRODUCT	COMPOSITION	TITRE	F.F.A. (as oleic)	ACID VALUE	IV	COLOR GARDNER	TYPICAL CHARACTERISTICS
"PLASTOLEIN" DD	"Emersol" processed† Vegetable Fatty Acids (Soya type)	5°C max.	98 to 100	195 to 200	145 to 155	4 max.	Much faster drying and higher in amounts of polyunsaturates, than conventional fatty acids of this type, DD is considerably less costly. Exceptionally stable to heat and light, DD is recommended for air-drying and baking alkyds.
"PLASTOLEIN" AA-D	"Emersol" processed† Vegetable Fatty Acids (low linolenic content)	5°C max.	97	192	135 to 140	2 max.	Recommended especially for light-colored finishes, air-drying and baking alkyds. High I.V. but low linolenic content combines excellent drying characteristics with exceptional color stability.

†"Emersol" Process—Trade mark of Emery's patented process for separating and purifying fats and fatty acids.

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MODERN PLASTICS
VOLUME 25 FEBRUARY 1948 NUMBER 6

PRECOCIOUS PLASTIC

Still only an infant in years, polyethylene's brilliant successes to date presage an even brighter future as its applications expand

THERE will always be a need for plastic materials which have unusually high dielectric strength, which are extremely light in weight, which can withstand low temperatures without getting brittle, which are flexible, which have high chemical resistance, and which have low moisture transmission.

Imagine, then, the enviable position in the plastics field of a single material which combines *all* of the above characteristics and, in addition, is non-toxic, tasteless, and odorless; needs no plasticizer; can be heat sealed; and is available in a wide range of colors. But imagination is not necessary. The material exists in polyethylene. The resin has been commercially available for non-military applications for only a little more than two years—and during that time the supply has been limited. But it is hardly surprising that a material which combines so many outstanding qualities has already found a wide range of applications.

Polyethylene was developed in England by Imperial Chemical Industries Ltd. It was first put into production during the war, mainly as an insulation material for high-frequency wires and cables.[1] By 1943, the Bakelite Corp. and E. I. du Pont de Nemours & Co., Inc., were producing the resin in quantity in this country—the latter under the name of Polythene.

Almost all the war-time production of polyethylene went into radar and other high-priority military projects which utilized the electrical qualities of the material. The appreciation of the versatility of polyethylene had to wait for peace.

Qualities of the material—The excellent electrical properties of polyethylene should be mentioned first in any recital of the resin's characteristics.[2]

There are 23 electrical, mechanical, and thermal properties which electrical engineers consider when evaluating insulation materials. Polyethylene is rated as excellent in 18 of these properties, and good in four. Its burning rate is questionable, but all other com-

[1] "Polythene, aid to radar," by John Langdon-Davies, MODERN PLASTICS 22, 218 (Dec. 1945).

[2] Concerning the characteristics of polyethylene, see: "Polyethylene—a new thermoplastic," by J. W. Shackleton, MODERN PLASTICS *21*, 99 (Feb. 1944); and "Polyethylene," by C. S. Myers, MODERN PLASTICS *21*, 103 (Aug. 1944).

4-COLOR PLATE COURTESY BAKELITE CORP.

1—*Flexible tumblers, bowls, and refrigerator dishes are molded of polyethylene. The same material is used to mold red sealer on jar at right*

petitive insulation materials are also deficient in this respect.

With a specific gravity of 0.92, polyethylene is the lightest of the commercial plastics—and the only one light enough to float in water.

As far as rigidity is concerned, polyethylene is unique. Thick sections can be classified among the more rigid plastics. In thin sections, the material is flexible, but it does not have limp, rubbery characteristics. Polyethylene retains its flexibility at temperatures as low as —70° F.

At the other end of the temperature scale, polyethylene pieces, if properly molded to avoid internal stress, will retain their form at 212° F. if not subjected to exterior stresses or loads. Its ability to do so is particularly surprising when it is noted that the melting point of the material is only 225° F.

The chemical resistance of polyethylene is also unusual. It is not substantially affected at room temperature by hydrochloric, sulfuric, or hydrofluoric acids. The only common solvents which will affect it at room temperature are the chlorinated hydrocarbons, such as carbon tetrachloride and tri-chloro-ethylene, and, to a lesser extent, the aromatic and aliphatic hydrocarbons. Polyethylene dissolves in a number of common solvents—but it does not become completely soluble in these solvents until the temperature is raised above 212°F.

4-COLOR COURTESY BAKELITE CORP.

2—Pitcher, tight-sealing dishes, and individual molds for ice cubes or frozen desserts are all molded of polyethylene

Injection molding

Polyethylene is easy to mold and can generally be molded in shorter cycles than other thermoplastics—except where close tolerances must be held. But the material has a number of unusual characteristics which necessitate some changes in molding techniques.

The most important difference between polyethylene and other thermoplastics from a molding standpoint is in viscosity. At molding temperatures (290 to 550° F.) polyethylene is more nearly a liquid than other thermoplastic materials. Thus less pressure is needed to inject the material into the mold than is used to inject other more doughy materials. Molders who use as much pressure as they are accustomed to for polystyrene or cellulose acetate will find the material squirting out of the die or, at best, causing excessive flash.

This characteristic causes no trouble if the following precautions are taken: injection pressure must be carefully controlled, the mold must be tight-fitting, and the locking pressure of the molding press must be evenly distributed. The free-flowing characteristic of the material then becomes an advantage because it facilitates flow around inserts, shortens the molding cycle, and makes it possible to use smaller gates (thus simplifying degating and finishing).

Another closely related characteristic of polyethylene is the extreme sudden change from a doughy consistency to a fluid state—or from the free-flowing condition back to a more solid state. As a result, the cooling system must be carefully designed so as not to set the material prematurely. If the runners are not kept warm, the material will slow down or set before the cavities are filled.

In setting molded pieces, it is important to make sure that the interiors of the pieces are cooled before they are removed from the die. If only the surfaces are cooled, the pieces will warp severely and cavitation will result. The fact that polyethylene is a good heat insulator makes it necessary to control the temperature of the cores if the pieces are to be thoroughly cooled.

Probably no company has molded as much polyethylene or had as much success with it as has Tupper Corp., Farnumsville, Mass. Mr. Earl S. Tupper of that company is the source of most of the above information on the molding characteristics of polyethylene.

Tableware and bowls—Tupper's well-merchandised Millionaire Line (Figs. 1 & 2) includes tumblers of various sizes, jiggers, cups, saucers, pitchers, sugar bowls, mixing bowls, refrigerator dishes, ice buckets, and poker chips—all molded of polyethylene. The properties of the resin already mentioned make these products unbreakable in the course of ordinary use, light, easily washable, non-toxic, tasteless, and odorless. Their flexibility makes the bowls squeezable (to form pouring spouts) and makes tight-sealing lids possible.

Full line of closures—An application which seems likely to account for a large volume of polyethylene in

3—Line of injection molded polyethylene closures includes: plug-type (A), screw-type with applicator (B), re-sealer for carbonated beverages (C), screw-type (D), two-piece pharmaceutical (E) and one-piece pharmaceutical with open end (F and G)

the near future is injection molded closures. The material is eminently suited for closures because of its high chemical resistance and its resilience. Over 2.2 billion plastic closures were made in 1947. It is possible that a substantial portion of this market will go to polyethylene. Injection molded plug-type closures will find an additional market because they are competitive with cork in price as well as in performance.

A complete line of polyethylene closures is being molded by the Lumelite Corp., Pawling, N. Y. (see Fig. 3).

Applicators—Lumelite's screw-type closure is also available with a polyethylene applicator (item B, Fig. 3). A similar applicator for nail polish is being made by Anchor Brush Co., Aurora, Ill., for Lorr Laboratories, New York, N. Y. The applicator (Fig. 4) has nylon bristles and is fitted into a molded urea closure on the package of Lorr's Dura-Gloss nail polish. The Lakone Co., Aurora, Ill., molds the shaft of the applicator of red Polythene, furnished by Du Pont. A 72-cavity mold is used on an 8-oz. machine. Anchor inserts the nylon bristles.

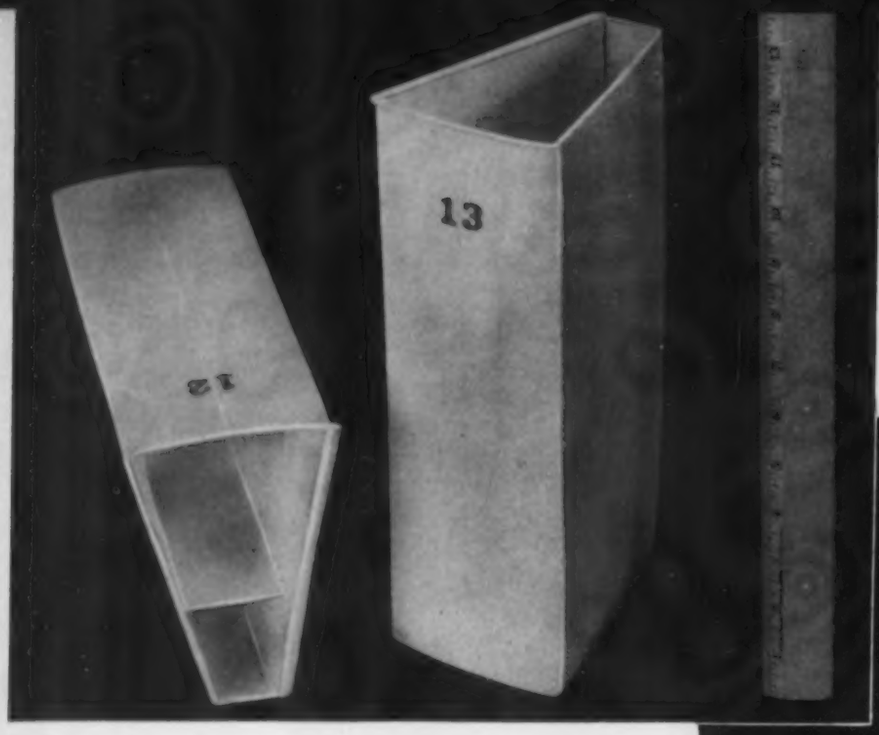
Bottle neck insert—Closely related to the closure field is the bottle neck insert being molded by Formold Plastics, Inc., Chicago, Ill., for The House for Men, Inc., Chicago. The molded polyethylene piece replaces the familiar pierced cork used in shaker-type bottles.

The bottle neck inserts for the His After-Shave Lotion (Fig. 5) are molded in a 20-cavity die on an 8-oz. machine. The material used is Bakelite polyethylene in the natural color.

Decorative closures—Closures which are decorative as well as functional are also being molded of poly-

4—Applicator for nail polish has nylon bristles set in red polyethylene shaft

5—Instead of the usual pierced cork, new after-shave lotion container uses molded polyethylene insert



6—Film developing tank of polyethylene resists chemicals used in developer. The tank is 11½ in. deep

7—Resilient polyethylene perfume closures are tight-fitting. A fluted surface also makes them decorative

ethylene. The packages for Desert Flower perfume, made by Shulton, Inc., New York, N. Y., are excellent examples (see Fig. 7).

The large-size bottle of perfume has a polyethylene cap with a fluted surface and a matching polyethylene base. The smaller, purse-size vial has a tight-fitting plug-type inner cap with an extension which serves as an applicator. All the molding is done by Shulton's own plastics division.

Shulton's experience and tests over a 2-yr. period contradict the widespread belief that the essential oils of perfume will "walk through" polyethylene. Shulton's tests show "no signs of loss of essential oils," although the polyethylene does tend to discolor (yellow) slightly after long contact with perfume.

Film tank—Probably the largest single piece molded of polyethylene is a film developing tank (Fig. 6) which is 11½ in. deep and contains 18 oz. of material.

The tank is molded of Bakelite polyethylene by Plastic Die & Tool Corp., Los Angeles, Calif., for the Auto-Photo Co., Los Angeles, manufacturers of automatic coin-operated photograph machines. An unusually designed single-cavity die is used to mold the tank because the piece is too deep to be removed from the core by conventional methods.

Ice cube trays—Another important application of polyethylene is the molding of ice cube trays of various designs. The material is excellent for this use because it sheds water (and therefore ice does not adhere to it), because it is flexible (and therefore the ice cubes can be removed by bending the tray), and because it does not get brittle at low temperatures.

Examples of standard-sized one-piece cube trays are the Roto-Tray molded by Republic Molding Corp., Chicago, Ill.; and the Esko-Tray, molded by the Roland P. Place Co., Midland, Mich., for Associated Plastic Companies, Chicago, Ill.

Polyethylene trays the size of individual ice cubes (or double that size for frozen desserts) are being molded by the Plastray Corp., Detroit, Mich. These Jiffy Cubes are shown in Fig. 2. At least two different molders are working on polyethylene dividers for conventional metal cube trays and one large manufacturer of refrigerators is considering the adoption of such a divider as standard equipment.

"Gangs" of toothpicks—Polyethylene is a natural for any application which requires some degree of rigidity combined with some degree of flexibility. Such an application is the toothpick (Fig. 9) molded by the Lakone Co., Aurora, Ill., for Lactona, Inc., St. Paul, Minn. The use of white polyethylene results in a toothpick which is sufficiently rigid to remove particles of food, yet sufficiently soft so that it will not harm the gums.

The toothpicks, called Plasto-Pix, are molded in "gangs" like book matches. Two gangs are molded in one shot on a 4-oz. machine. Each gang has 17 toothpicks attached with wall sections thin enough to allow a pick to be torn off when it is needed. The gang is stapled into a clear cellulose acetate match-book-like container.

Extrusion

Polyethylene can be extruded with the same equipment used to extrude other thermoplastics or with

machinery designed for the extrusion of rubber. Perhaps its only unusual characteristic as an extrusion material is its high rate of shrinkage—which is no problem to extruders who have worked with rubber.

Wires and cables—As has been said, the first application of polyethylene was as an insulating material in electrical wires and cables. And that use is perhaps still first in pounds of material used. Examples of such applications are the four polyethylene-insulated wires extruded by the Surprenant Electrical Insulation Co., Boston, Mass., shown in Fig. 8.

Most interesting is the cable which Surprenant developed in response to an imposing list of specifications laid down by the War Dept., Engineers Board. The board wanted a tow line for rubber boats which might be sent in close to a hostile shore for reconnaissance from submarines. The cable had to float, so that its weight would not prevent the rubber raft from being rowed; it had to have two conductors for telephonic communication; it had to stand a 1500-lb. pull; it had to have practically no stretch; it had to be flexible enough to be reeled on a standard Signal Corps cable drum; it had to be blue or gray; its insulation had to be capable of withstanding long immersion in salt water.

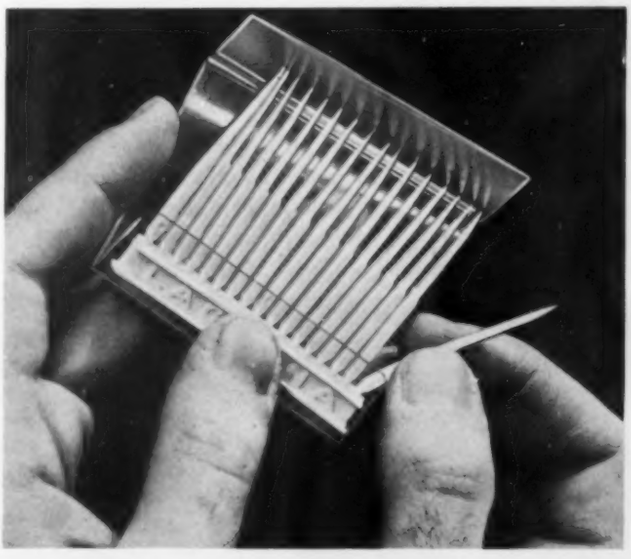
The factors of buoyancy, electrical insulation, and flexibility immediately suggested polyethylene. But another material was needed for tensile strength and to prevent stretch. After much experimentation, Surprenant chose Fortisan, an ultra-strong saponified cellulose acetate rayon yarn.

The final design provided for a blue-gray polyethylene cable with a cross-section much like an oval with a pinched-in waist (Fig. 9). In the center of each half of the oval is a woven strand of Fortisan around which the conductor, consisting of four strands of #34 copper wire, is wound spirally, and, in turn, covered with six more strands of Fortisan.

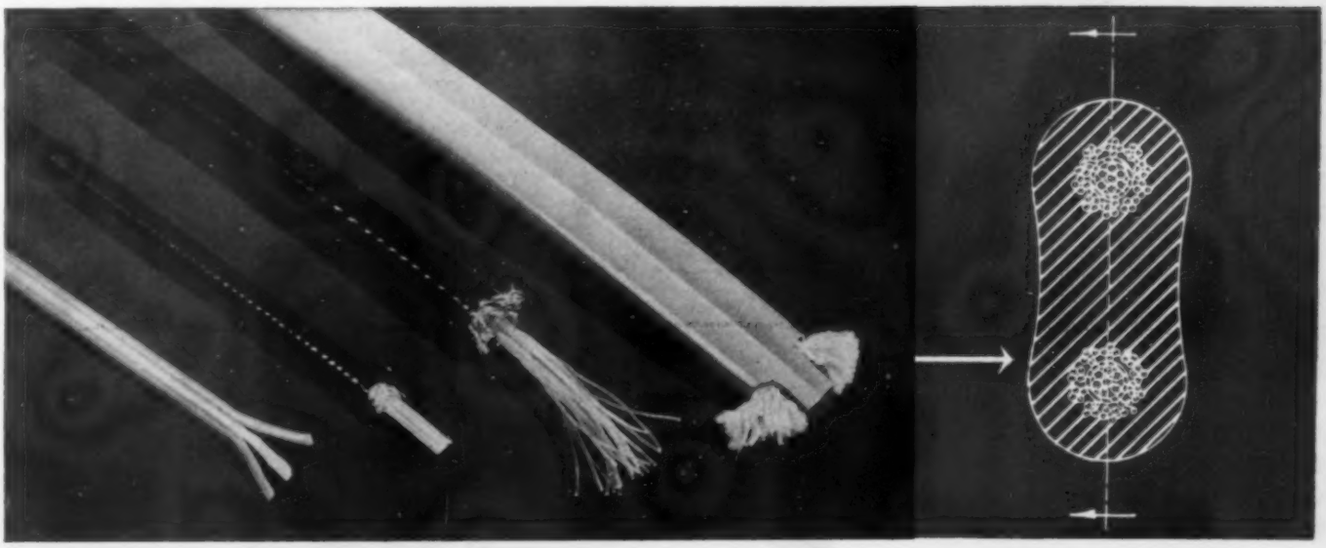
Film for packaging—When compared with injection molded applications of polyethylene (where new applications are popping up every week) or when compared with the extrusion of wire (where polyethylene insulation is already "old hat"), the field of extrusion of film seems quiet. But that is only on the surface. Although comparatively few applications of polyethylene film have been announced, many experts believe that extruders of film will eventually consume more polyethylene than the extruders of wire and the injection molders combined.

Many of the country's major film extruders are devoting a large portion of their productive capacity to polyethylene film and tubing. New companies (in-

9—Flexible, non-toxic, tasteless polyethylene toothpick can be torn from this molded "gang"



8—Typical electrical applications are (left to right): wire with three polyethylene-covered conductors; wire with split polyethylene dielectric; cable with conductor insulated by unwoven polyethylene monofilaments and polyethylene sheath; flexible tow cable



cluding the recently established plastics division of a large metals firm) are entering the field every day. Polyethylene is being extruded in thicknesses ranging from 1 mil to 30 mils and in widths up to 60 inches. It is available in seamless tubing with lay-flat widths ranging from 2 to 56 inches.

The cause of all this activity is the widely recognized suitability of polyethylene for packaging because of its low rate of water-vapor transmission, its low water absorption, its flexibility at low temperatures (important in the packaging of frozen foods), its chemical inertness, its good tear resistance, its lack of odor, and the fact that it can be flame sealed or heat sealed.

A typical application of unsupported polyethylene film is the frozen turkey package (Fig. 11) manufactured by the Traver Corp., Chicago, Ill., using polyethylene film extruded by Visking Corp., Chicago, Ill.

Until recently, the lack of a suitable adhesive for polyethylene limited the material to applications where the unsupported film could be used. But pressure-sensitive adhesives have been put on the market by R-B-H Dispersions, Bound Brook, N. J.; S. R. Miller, Dedham, Mass.; BB Chemical Co., Cambridge, Mass.; and others. A number of converters have also developed adhesives for their own use.

As a result, polyethylene film is now being laminated to papers of various types, to aluminum foil, to cellulose acetate sheet, to cellophane, to Fiberglas, and to cotton scrim. Although no applications of supported polyethylene film have as yet been announced, converters are known to be experimenting with its use for the packaging of prunes, coffee, flour, sugar, frozen foods, ball bearings, and hygroscopic dental powders.

Other applications of film—Outside of the packaging field, polyethylene film is being fabricated into refrigerator bowl covers, tablecloth covers, and similar consumer items. Polyethylene has a price advantage over other materials in these applications because of its lower specific gravity (which means more area per pound) and because it can be used in thinner sections (which means still more area per pound). It also has the advantage of being odorless.

Examples of this type of application are the Vita-Guard lettuce bags, bowl covers, mixer covers, and refrigerator bags, made by Klear-Vu Products Co., Middlesex, N. J.

Tubing and pipe—Because of its high chemical resistance, polyethylene is an excellent material for the extrusion of tubing or pipe for piping acids or other corrosive liquids such as the washes used in paper mills.

The Anesite Co., Chicago, Ill., is extruding polyethylene tubing ranging from $^1/_4$ to $2^1/_2$ in. inside diameter and with wall thicknesses from $^1/_{16}$ to $^1/_8$ inches. The Henry Stuckart Co., Chicago, which manufactures stainless steel chimney linings, uses polyethylene tubing with an inside diameter of $^3/_4$ in. to drain condensation (which contains a dilute solution of sulfurous acid) out of chimneys.

The American Hard Rubber Co., New York, N. Y.,

11—Low rate of water vapor transmission of polyethylene film and its flexibility at low temperatures make it ideal for the packaging of frozen foods like these turkeys

10—Thin sections stripped from slabs of foam polyethylene have been employed in plastic surgery

is now in production on a complete line of polyethylene pipe and fittings. The pipe comes in 10-ft. lengths and in sizes ranging from 1/2 to 2 inches. The fittings available include 90 and 45° elbows, reducers, pipe caps, T's, couplings, and nipples. The pipe is extruded and the fittings are injection molded of black Du Pont Polythene.

Medical applications—Polyethylene has proved to be a valuable material for doctors and surgeons. Small diameter tubing, as developed by Surprenant, is used in intravenous feeding. Polyethylene also shows promise, according to a recent report in the *Journal of the American Medical Association*, as a replacement for membranes which must be removed in brain operations. Two surgeons connected with the Mayo Foundation have already recommended polyethylene for replacing sections of blood vessels.

Sections stripped from slabs of foam polyethylene (Fig. 10) prepared by Bakelite have been used experimentally as padding to fill out jaws or cheeks which are being reconstructed.

Monofilaments—Textiles woven from extruded polyethylene monofilaments have excellent wearing qualities, good drape, and good hand. In addition, the flexibility of the material makes the monofilaments easier to weave than some other plastic monofilaments, which are often wiry. But all these advantages have been outweighed by one important disadvantage of the material. Polyethylene monofilaments have a high rate of shrinkage (8 to 10% at 65° C.) which make them unsuitable for use in automobile seat covers or similar applications.

As a result, the amount of material which has thus far been extruded into monofilaments is negligible and that little which has been produced has gone into lady's handbags, belts, shoes, and various and sundry novelty items.

However, the Bakelite Corp. has recently announced the development of a commercially feasible method of extruding polyethylene monofilaments which have a shrinkage of only 2 1/2 to 3 1/2% at 65° C. This compares favorably with a shrinkage of 4% at a slightly lower temperature for Saran—a material which is already widely accepted for use in automobile seat covers and upholstery in general. A higher molecular weight resin is used to extrude the low shrinkage monofilaments. The method involves an orientation of 560 to 575% and a double annealing process.

Miscellaneous processes

Blow molding—The use of thermoplastic materials for the blow molding of bottles has already been covered in this magazine.[3] The use of polyethylene results in the already famous squeezable bottles which are well adapted for use in packaging talcum powder, shave lotion, deodorants, or other cosmetics. The high chemical resistance of the resin makes it possible to

[3] "Blow molding," by James Bailey, MODERN PLASTICS 22, 127–133, 198, 200 (Apr. 1945).

12—Flexible polyethylene bottles can serve as dispensers as well as containers

mold bottles to contain hydrofluoric acid and other chemicals of a corrosive nature.

The Plax Corp., Hartford, Conn., is blow molding a stock line of polyethylene bottles with capacities up to 16 oz., the largest bottles which can be blow molded with presently available equipment. An example of the use of polyethylene bottles for the packaging of cosmetics is the container for Stopette (Fig. 12), a deodorant made by Jules Montenier, Chicago, Ill.

Flame spraying—The high chemical resistance of polyethylene has led many companies to attempt to use it as a coating to protect vats for corrosive chemicals, plating tanks, acid pumps, etc. The most successful method yet developed for applying such coatings is a process which makes use of the Schori flame-spray powder pistol (Fig. 13). The method is now being used in this country by the Schori Process Div., Ferro-Co Corp., Long Island City, N. Y., and in England by an affiliated company.

The difficulty of applying polyethylene by flame spraying arises primarily from the fact that all available spraying equipment is designed for powdered metal and makes use of high heat which has undesirable effects upon the properties of polyethylene. A secondary difficulty is the fact that polyethylene alone will not adhere to metal.

The Schori process overcomes these difficulties by applying two separate modifications of Du Pont Polythene. The first coating, called Schorithene 251, has an adhesive mixed with the resin to give the first coat a solid bond to the metal tank. The second layer, called Schorithene 222, has a material mixed with the Polythene to give the lining added toughness. A skilled operator, it is claimed, can avoid the crazing or cracking often caused by the heat used in spraying.

Although the flame-sprayed coatings can be injured by impact, there seems to be no reason to believe that age or continued contact with chemicals has any effect. Accelerated exposure tests have had no noticeable effect on the coatings. One coating applied to a marine railway over four years ago has yet to show any

13—Flame-sprayed polyethylene coatings can protect vats, plating tanks, acid pumps, and other equipment from corrosive chemicals

signs of deterioration despite constant exposure to all types of weather and alternate immersion in salt water and drying in air.

Even greater success is predicted for flame spraying when a resin is available with a high molecular weight (about 80,000), and smaller particles (about 80 mesh). Other methods of spraying polyethylene are also known to be in the early stages of development.

Things to come

So much for the short and brilliant past of polyethylene. What does the future hold in store for the material which has proved itself in so many varied applications during the two years it has been available for non-military applications?

Improvements in the resin—The most obvious prediction is that increasing markets will be found for those applications which have already proved themselves. Another obvious future development is the expansion of the potential market for polyethylene by improvements in the resin itself. Both Bakelite and Du Pont are working on a modified polyethylene resin which will make it possible to mold polyethylene items which can truly be classified as "glossy." Should this development be accompanied, as it well may be, by further reductions in the price of the resin, polyethylene may successfully compete with polystyrene and cellulose acetate in many applications.

Both materials manufacturers are also known to be conducting experiments leading towards a polyethylene with higher abrasion resistance, decreased flammability, and higher heat resistance.

Textiles and rope—There will undoubtedly be considerable activity in the field of extrusion of monofilaments for textiles. Another possibility is polyethylene rope. If the remaining problems (tensile strength and stretch) can be overcome, polyethylene rope would have numerous advantages: it would not absorb water; it would float; it would be impervious to gasoline, oil, grease, fungus, and rot; the ends could be heat sealed; and its price would be lower than that of Manila rope.

Bottles and cables—The future will doubtless produce more polyethylene bottles. At least two large companies are known to be experimenting with methods (other than blow molding) of making them.

Another type of "bottle" is the collapsible, disposable, baby's milk bottle which will soon reach the market. The "bottle" itself will consist of extruded polyethylene lay-flat tubing, produced in continuous lengths and heat sealed transversely at about 6 inch intervals. Thus the interior remains sterile until used. To use, a section of the tubing is cut off with scissors and the opened end fastened to a simple molded plastic fitting which also holds the nipple. This product, which will completely eliminate the need for washing and sterilizing nursing bottles, has a vast potential market. In fact, it is stated on good authority that a large extrusion plant, now under construction, will be completely devoted to the production of this special tubing.

The growing popularity of television will result in a market for thousands of pounds of polyethylene in coaxial cables which "pipe" the programs to distant broadcast points. Another type of polyethylene cable is being developed by the Western Electric Co. to replace the familiar lead-covered telephone cable. This cable, known as Alpeth, will use a thick sheathing of polyethylene for insulation.

Future unlimited—This article has confined itself to those applications of polyethylene which are already in production or are under development. The products mentioned are the solid accomplishments of the two-year-old prodigy of the civilian plastics world. The future possibilities, some of which stagger the imagination, indicate that the prodigy will soon become a full-fledged genius.

New latex cures at room temperature

by E. B. OSBORNE*

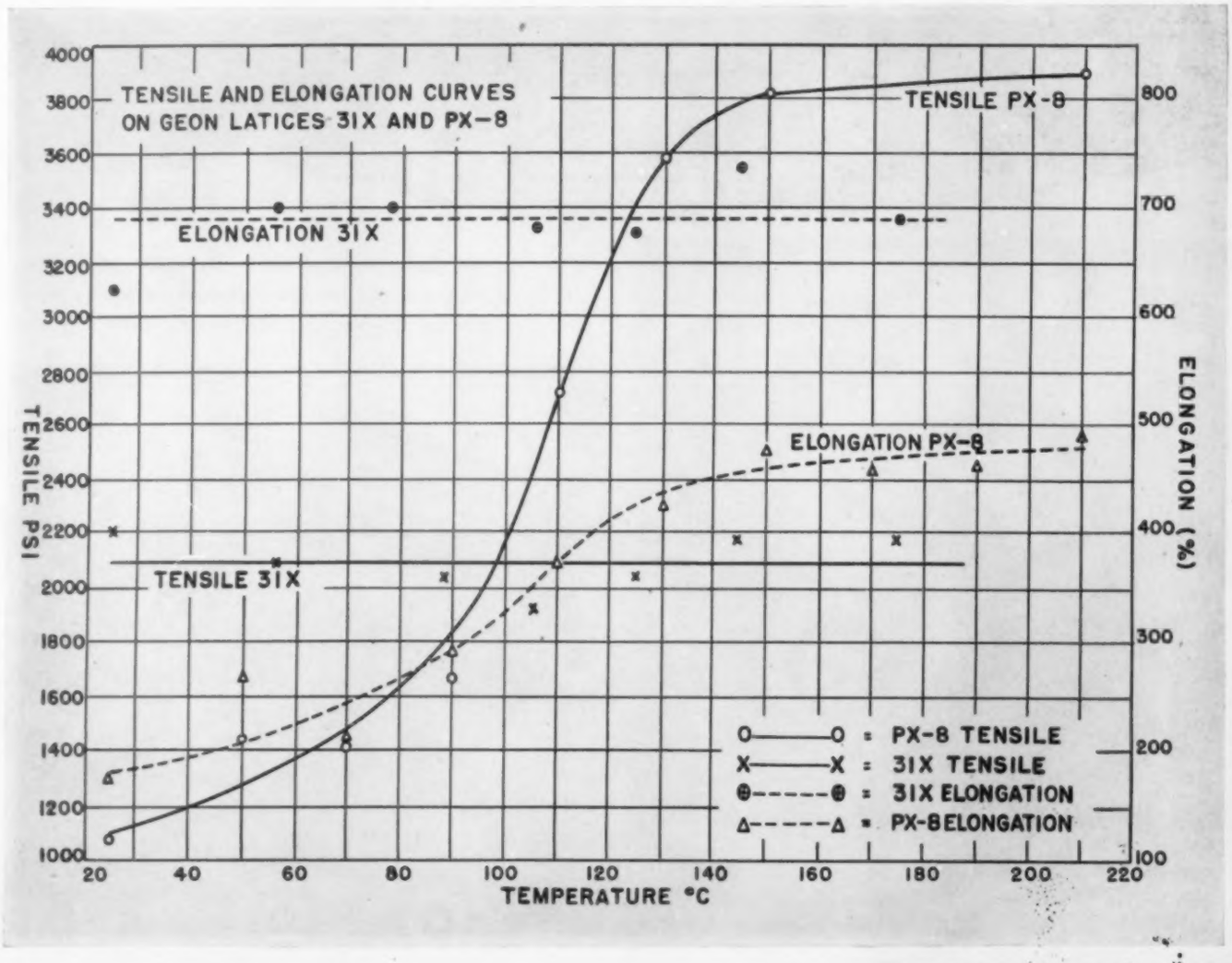
THE plastics industry as a whole has not yet become well acquainted with latex, but there is increasing evidence that it won't be long before all coaters and film manufacturers, at least, will be more latex-conscious. Certainly American industry in general is using synthetic elastomeric latices in ever-increasing volume, and natural rubber latex imports are still not sufficient to meet the demand.

Processors have learned that latex is a desirable form in which to handle elastomeric materials. Plastics latices have the same advantages. Coating with latices has the decided advantage over solution coating in that the need for expensive solvent recovery equipment is eliminated. This is for the reason that water is the latex dispersion medium to be evaporated. It seems that any film manufacturer or coater who does not keep up with progress in latex development may some day find himself in an unfavorable competitive position as latex applications expand.

But as easy as latex is to handle at present, it will become even easier in the future if the new vinyl Geon Latex 31X meets the expectations of its developer, B. F. Goodrich Chemical Co. The new latex is particularly notable because it will cure or set and form a strong, coherent vinyl plastic film or coating by simply drying at or near room temperature. Furthermore, this particular latex contains no plasticizer and thus avoids many of the disadvantages such as odor or exudation that sometimes limit the usefulness of plasticized films and coatings.

There are other types of Geon latices. Those designated as the "X" series are colloidal dispersions of vinyl polymers. In other words, (*Please turn to page 192*)

* Technical service engineer, B. F. Goodrich Chemical Co., Cleveland, Ohio.

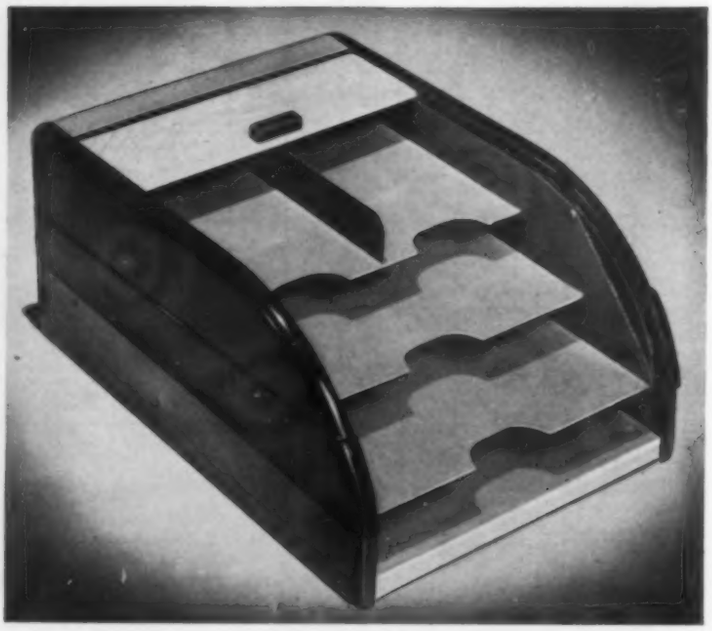


FILES

1—Private papers may be kept at home in this personal file. Phenolic is used to form the sides and handle. Equipped with index and lock, the file has expandability of 3 inches

2—Phenolic is again used in sides of this slide card cabinet. The cover is of polystyrene; the card holder of cellulose acetate

3—Three compartments accommodate letterheads in the gracefully curved stationery cabinet for desk use. Two others hold envelopes



Modernized with Plastics

Phenolic sides and polystyrene roll-type covers avoid the box-like appearance commonly found in file cabinets

YOU STILL cannot fit a square peg in a round hole but it is now possible to keep rectangular file cards in desk-top cabinets which get away from the angular, box-like appearance usually found in such office equipment. The new cabinets utilize phenolic, polystyrene, and acetate parts in combination with steel or aluminum.

The line of cabinets produced by Moldmaster, Inc., New York City, includes three types of file cabinets and one stationery cabinet. The sides of all the cabinets are compression molded of Durez phenolic. Similar patterns are molded in all side panels to give the cabinets a "family resemblance" to each other and achieve uniformity of appearance when a number of the units are used in a group.

Interlocking strips of extruded polystyrene are used in two of the cabinets for roll-type covers like those on old-fashioned roll-top desks. Cellulose acetate is used for small parts such as label holders.

Shelves, backs, and bottoms of the cabinets are of steel or aluminum. The Art Steel Co., Bronx, N. Y., makes all the metal parts.

All of these cabinets are being marketed through stationery stores, office furniture dealers, department stores, and other distributing outlets.

Personal file

The Moldmaster personal file (Fig. 1) is designed for keeping private documents, insurance policies, and similar papers normally kept in the home. The cabinet is approximately $13^1/_2$ in. wide, $10^5/_8$ in. high, and $6^5/_{16}$ in. deep. The phenolic sides and handle are molded by Bridgeport Moulded Products, Inc., Bridgeport, Conn. Each side weighs about $10^1/_2$ ounces. A two-cavity die is used to mold the sides in a $2^1/_8$-min. cycle.

Executive card cabinet

The Glido executive file card cabinet is made in three sizes to hold 3 by 5, 4 by 6, or 5 by 8-in. cards. The cabinet for 4 by 6-in. cards (Fig. 2) is 8 in. wide, $10^3/_{16}$ in. deep, and $6^1/_4$ in. high. The phenolic sides, weighing about $10^1/_2$ oz. each, have grooves to accommodate the extruded polystyrene roll-type cover. The card holder is made of cellulose acetate. Bridgeport Moulded Products, Inc., again is the company molding the phenolic parts.

Stationery cabinet

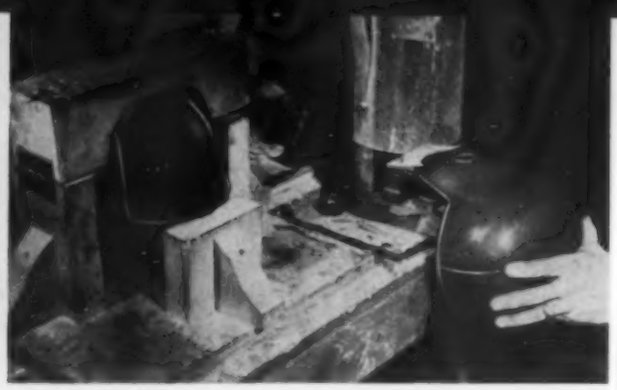
The largest cabinet in the Moldmaster line is the executive stationery cabinet (Fig. 3), which measures about $10^1/_8$ in. wide, $14^{15}/_{16}$ in. deep, and $6^1/_4$ in. high. It has an extruded polystyrene roll-away lid. Inside the cabinet there are three pigeon-holes for letterhead stationery and two for envelopes. The phenolic sides, which weigh about $14^1/_5$ oz. each, are molded in a two-cavity die by the Plastics Div., National Lock Co., Rockford, Ill.

Hinge-covered card cabinet

Most conventional in design of all the items in the line is a hinge-covered card cabinet (Fig. 4) which holds 800 of the 3 by 5-in. cards. Similar cabinets to hold 4 by 6 and 5 by 8-in. cards will soon be added to the line. A molded channel in the phenolic sides serves as a runner for the follower block which holds the cards upright. National Molding Co., Irvington, N. J., molds the sides, which weigh about $3^3/_4$ oz. each.

4—Eight hundred 3-by 5-in. cards can be held in this hinge-covered card cabinet. The same paneling design is used on these phenolic sides as on other items in line

Press operator cuts off flash and sprue with a knife, punches slots for chin straps (far right), and puts the helmet in a wooden shrink fixture (center)



One-piece football helmet

TOUGH, colorful plastic football helmets for boys are now invading a market formerly dominated by leather. The helmets, molded in one piece, are not only tough and colorful, but they are also lighter and less expensive than the best leather helmets.

Grebar, Inc., New York, N. Y., molds the helmets of cellulose acetate butyrate for the Raleigh Co., New Rochelle, N. Y., a sporting goods house.

The choice of a material for the helmets was complicated by the fact that it had to combine high impact strength with sufficient flexibility so that the helmet could be spread to go on over the ears easily. The problem was solved by the development of a special formulation of Tenite II, which gave the resin additional flexibility without sacrificing any of the usual impact strength of butyrate. Undercuts were necessary so that the helmet would cup the ears. A single-cavity stripper plate die was made to mold the 15-oz. helmet on a 16-oz. machine. The cycle is 1 minute.

The helmets are molded of red, green, white, blue, or gold material. The holes in the ear-cups are molded in, as is a fore-and-aft ridge across the top of the helmet. A contrasting color is later sprayed on the ridge.

The sprue and the unusually large flash which forms between the halves of the female part of the die are knife-trimmed at the molding press. The operator also punches the slots for attaching the chin straps, and puts the helmet into a shrink block. These three operations (trimming, punching, and inserting in shrink block) can be done by the press operator during the minute it takes to mold the next helmet.

Grebar delivers only the one plastic piece; Raleigh takes care of inserting the webbing, sweatband, and lining (felt or foam rubber), attaching the chin strap, and spraying on the stripe.

A mold is now being made for a similar helmet in full size for college and professional teams.

COLOR PLATE COURTESY TENNESSEE-EASTMAN CORP.

Technical papers at S.P.E. convention

The accompanying abstracts of the various technical papers presented at the annual meeting in Detroit of the Society of Plastics Engineers were prepared for MODERN PLASTICS by the authors of the papers. The National Annual Conference was held in the Horace H. Rackham Educational Memorial on January 21–23.

PLASTICS IN THE AUTOMOTIVE INDUSTRY

by W. M. Phillips, General Motors Corp.

By 1942 plastic use had increased so that about 100 parts were used in the average automobile. Combined weight of these parts was 5 pounds. In 1947 the use was much the same and in 1948 it will still be similar. Some kinds of plastic have replaced others and there is a lot of competition developing. Vinyls and polystyrenes are getting into a better position while nylons and other plastics have improved their chances of use in upholstery. Certain laminates are coming on and may replace some steel parts. The writer is bullish on the prospects for the use of plastics by the automotive industry in the future.

STRETCH ORIENTATION OF POLYSTYRENE AND ITS INTERESTING RESULTS

by James Bailey, Plax Corp.

Ordinary processes of polystyrene manufacture result in molecular orientation which may produce either strength or weakness. Stretching produces the greatest strength in the direction of stretch and hence unilateral stretch is useful only in monofilaments. Wide sheets require bilateral stretch.

The long relaxation time of stretched sheets permits lamination without serious loss of strength and toughness. The tendency to relax enables preforms of wound or stacked sheets, confined in a simple mold, to consolidate themselves when heated, without the addition of external pressure.

Polariscopic study of strains requires considerable knowledge and experience since hot stretching may produce 10 times as much birefringence as rupturing stress at room temperatures, and the hot and cold birefringence are of opposite sign. Moreover, equal bilateral stretching produces no evidence of strain.

Strength and toughness are a function of size and small fibers can be made which show cold stretching up to 85 percent. Thin, bilaterally stretched sheets show stretch up to 25 percent.

THE PRODUCTION ECONOMICS OF PRESS DESIGN

by Henry M. Richardson, DeBell & Richardson, Inc.

To be competitive, the plastic molder must continually turn out more and more pounds of salable molded parts per day per press. In this paper the cost of the material conversion is analyzed and charted by its components, and the investment value of cycle time savings indicated. For example, a 150-ton press might mold a 15-oz. charge at 4000 p.s.i., but only half this quantity at 8000 p.s.i. A cure time of 40 sec. in each case and a charge and transfer time of 20 sec. indicates a material conversion cost of from 5.6 to 7.7¢ per lb. at 4000 p.s.i. and 10.2 to 14.5¢ per lb. at 8000 p.s.i. A reduction of this cycle by 10 sec. would be worth annually, in the resulting savings during normal three-shift operation, an amount equal to the amortization, carrying charges, and taxes on an investment of approximately $10,000.

THE CONSUMER LOOKS FOR QUALITY

by P. S. Olmstead, Bell Telephone Laboratories, Inc.

The more critical attitude of the consumer in the present buyer's market will be associated with wants that are both more extensive and more specific. It is a primary problem for the engineer to design and produce products that will satisfy such wants. It is also important that his procedures provide economic control of quality. This paper reviews pertinent engineering developments in this field and concludes by outlining a way to attain economic control of quality to satisfy consumer wants.

DESIGN AND FINISH REQUIREMENTS ON MOLDS FOR THE PRODUCTION OF PLASTIC LENSES

by Emil J. Marslec, Acme Scientific Co.

Lens molds are described which permit the use of optical methods in finishing the lens surfaces, eliminating the need of hobbing by the use of inexpensive inserts. With such inserts it is possible to utilize better grade materials, resulting in surfaces free of inclusions and blemishes. These surfaces will also have a true figure of revolution and will be optical in character. In addition, the reflectivity and surface finish of the mold insert surfaces are discussed, with some attempt to correlate these data with actual surfaces produced on plastic lenses by the molding operation.

NYLON AS AN INDUSTRIAL PLASTIC

by J. E. Teagarden, E. I. du Pont de Nemours & Co., Inc.

This material is available in a number of formulations designed to meet specialized requirements in fields of injection, compression, and extrusion, and in solution coating. Nylon has unusual properties which recommend it for use where conventional thermoplastics and some thermosetting materials are unsatisfactory.

Techniques for making articles of nylon are slightly different from those used for other plastics. Modifications necessary to mold or extrude nylon in conventional equipment are discussed. Emphasis is placed upon a planned approach to avoid misapplication of the nylons.

PLASTICIZERS IN THE PLASTICS INDUSTRY

by LaVerne E. Cheyney, Battelle Memorial Institute

Many properties of the finished plastic composition may be varied widely and somewhat at will, by the proper selection and use of plasticizer. Such properties include hardness, flexibility, impact strength, resilience, electrical characteristics, aging behavior, permeability, and others.

Recent advances in the field of plasticizers include the development of new flame-resistant materials, applications of polymeric materials as plasticizers, and perfection of the paste technique of fabricating vinyl plastics.

PRESENT DEVELOPMENTS IN STEAM PREHEATING

by S. K. Moxness and J. Formo, Minneapolis-Honeywell Regulator Co.

Another year of practical experience with steam preheating has served to prove the practicability of this method for general transfer molding. Improvements in the method of metering the moisture into the preheating atmosphere make it possible to maintain precise control over the moisture content of the preforms. This has made it possible to control (*Please turn to page 180*)

Report on S.P.I. low pressure conference

The third annual technical session and exhibit of the Low Pressure Industries Div., Society of the Plastics Industry, held at the Edgewater Beach Hotel, Chicago, on January 15 and 16, was generally acclaimed as the most constructive meeting in the history of the division.

Evidence that this youthful branch of the plastics industry is now making solid progress, after two tough years during which it struggled to readjust itself to the demands of a peacetime economy, can be seen in the accompanying abstracts from papers delivered at the session.

In a banquet address on January 15, Ralph W. Carney, sales manager, the Coleman Co., Inc., voiced a plea for renewed interest in real selling, which he stated has now been absent from the American scene for nearly 10 years. Mr. Carney emphasized that only through vigorous selling and merchandising can the nation's expanded productive capacity be fully utilized, full employment assured, and the challenge of alien philosophies successfully refuted.

DEVELOPMENTS IN CATALYSIS AND PROCESSING OF POLYESTER RESINS

by D. G. Patterson, American Cyanamid Co. Co-author, Dr. J. D. Robinson

Polyester resins are shipped to fabricators in a stabilized condition and, just prior to use, the fabricator stirs in a predetermined amount of catalyst. This is where the trouble begins.

In work with polyesters, a knowledge of the use of catalysts to meet the specific requirements of operation and end product is very important. It has been recognized that the catalyst used in polyester resins and, more specifically, the concentration of catalyst, has a very important bearing on a satisfactory cure. The work described in this paper was started in an attempt to discover those variations in catalysts that would be acceptable under conditions of time and temperature specified by production requirements.

Approach to the problem was through an analysis of time-temperature (exotherm) curves for a large number of resin-catalyst systems.

Cure cycle of a polyester resin appears to consist of at least four significant portions—the induction period, during which the resin is heated without any noticeable reaction taking place; the initiation of the exothermic reaction; the peak temperature of reaction; and the reduction of temperature following climax of reaction. The first period (also known as gel time) is waste time in application work but must be maintained in part at least, since it defines the stability of the resin in storage and also its catalyzed bath life.

In the course of this work, a group of peroxides were found which cure polyesters rapidly at room temperature without externally applied heat. Previously, promoters have been used with conventional peroxides to initiate gelation at low temperature but in nearly all cases such systems have been highly colored and their use limited correspondingly. Low-temperature peroxides, such as Laminac Catalysts 323 or 347, are not subject to this objection and should find a wider field of activity.

NEW DEVELOPMENTS IN POLYESTER RESINS

by Dr. H. L. Gerhart, Pittsburgh Plate Glass Co.

Whereas some of the early polyester resins were shipped in dry ice to prolong their useful life, we now have materials which may be stored for as high as 50 or 60 days. Fabricators are asking a great deal from the resin manufacturer when they demand a resin that can be held at 120 to 130° for an extended period, then will polymerize quickly under elevated processing temperatures. However, if they keep after us, they may get it.

Cures available with the newer types of polyester resins are about as rapid as the time required to raise the temperature of the material to 250°. In addition, it is now possible to obtain relatively rapid cures at room temperatures.

Rapid cures permit the casting of large polyester pieces; castings weighing as much as 50 lb. and having haze-free qualities have been produced. Objects such as bowling balls may be cast on a production line basis. Curing in sunlight is also possible on some types of laminates, using a stretch frame press.

A color range from that of a winter sunset to water white may now be obtained in these resins. Under test, they exhibit no crazing and little color deterioration—only normal chalking. By simply washing the panels with a kitchen cleaning agent, practically the original gloss can be restored.

For exterior applications, it is safest to choose basic earth colors which are dark, avoiding certain pastels. From the standpoint of the fabricator, it is important to remember that different pigments may either retard or accelerate the cure.

EVALUATION OF THERMOSET LAMINATED SHEET PRODUCTS

by Dr. F. L. Minnear, Shellmar Products Corp.

There has been criticism of the contact pressure laminating industry that standards have not been set up and that there is not enough engineering data on the physical, electrical, and chemical properties of their products, such as the National Electrical Manufacturers Association has for the phenolic laminating industry. This we admit to be true. Our alibi is that this is yet a new industry. N.E.M.A. was not organized until 10 years after the phenolic laminating industry was established.

There are several standard grades of phenolic laminates. The contact pressure laminates are not yet well standardized, but there are even more grades possible, because of the variations that can be introduced. Comparisons, therefore, should be made in a very general way.

To the layman there is great similarity in the appearance of the two laminates. In fact, a sheet *could* be made by each process so that even the expert would have to look twice before he could distinguish between the two. They are both thermoset laminates. Both have great strength, primarily a function of the filler. Perhaps the tensile and impact strengths of Fiberglas laminates favor the contact pressure method because there is much less danger of breaking the glass fibers in this process.

The resistance to splitting is the weakest strength factor of both laminates. Both laminates are difficult to glue, requiring special adhesives or roughened surfaces. Both have excellent electrical properties. The thermal insulating values are in the same order of magnitude. Both can (*Please turn to page 177*)

The Seventh
MODERN PLASTICS COMPETITION

FOR the first time since 1941 the doors of Modern Plastics' Hall of Fame now swing open! This is an invitation for the entry of post-war products in the Seventh Modern Plastics Competition.

Started in 1936 for the purposes of stimulating progress in the plastics industry and improving appreciation of plastics on the part of the public, the distributive trades and industrial users, the Competition grew in importance to the point where, in the sixth year, 1941, it embraced thousands of entries. Each year brought into existence large numbers of new applications and new designs. Each year's problems became the next year's prize winners.

During the war the Competition was discontinued for the obvious reason that most new developments were for military purposes and were therefore either secret or non-competitive. In that period, however, the industry made tremendous progress in technique, design, and equipment. Many new materials came into being, extending the use of plastics into new fields. All these factors have contributed to a multitude of new plastics applications since V-J Day. From these will come the entries in the 1948 Modern Plastics Competition.

In the list of twenty Competition classifications on page 89 attention is called to Number 20, "Informative labeling and merchandising," which is designed to give recognition to those who have faced up to the important present problem of selling plastics. This one classification is horizontal; a winner in any other classification may also gain the award for the best informative labeling and merchandising job done since V-J Day.

One award will be given in each classification group. Because of this, should any classification appear too embracive as indicated by the number of entries, Modern Plastics reserves the right to establish new classifications.

Entries are welcomed from all concerns or individuals who have had any part in creating or producing any plastic component, product, or application now in production and first marketed since August 31, 1945. Entries will be accepted from now until May 15, 1948. Any number of entries may be submitted and there are no fees or obligations of any kind.

The Board of Judges is comprised of six top executives—two from the field of merchandising, two from the field of design, and two industrial users of plastics. Judging will take place on or about June 1, 1948. Winners of awards will be announced in the September 1948 issue of Modern Plastics.

Further details including instructions for entry will be found on succeeding pages.

THESE SIX JUDGES WILL CHOOSE THE WINNING ENTRIES IN THE 1948 MODERN PLASTICS COMPETITION

ALFRED AUERBACH—Founding editor of *Retailing Home Furnishings* and for 14 years its chief, our senior judge served during the war as Director of the Consumer Durable Goods Div. of OPA. He now heads Alfred Auerbach Associates, sales engineers in home furnishings and allied industries, offering market research, merchandising and styling counsel.

DON G. MITCHELL—The youthful president of Sylvania Electric Products Inc., is referred to as the man who put electric light bulbs in egg cartons, beer in cans and milk in paper bottles. His brilliant career has been a series of top executive posts with such firms as Niagara-Hudson Power Co., American Can Co., Marshall Field & Co., and Pepsi-Cola Co.

J. GORDON LIPPINCOTT—A senior member of Lippincott and Margulies, Inc., industrial designers, J. Gordon Lippincott has been responsible for some important design trends in plastic products and for the successful styling of many manufactured items. His new book *Design for Business* has aroused nation-wide interest among manufacturers and merchandisers.

EPHRAIM FREEDMAN—Director of Macy's Bureau of Standards for 20 years, Ephraim Freedman has helped to establish pre-market product testing and to strengthen plastics merchandising. He is president of the American Association of Textile Technologists, a Fellow of the American Institute of Chemists and, in addition, is either a director or member of seven other professional bodies.

LAWRENCE COWEN—An engineer with a flair for industrial management, Lawrence Cowen, president of Lionel Corp., has taken the model railroad firm founded by his father to a 1947 retail sales record of over $23,000,000. Five million boys and men run Lionel trains (containing molded parts which make Lionel Corp. a big industrial user of plastics) over 12,000 miles of miniature track.

JEAN O. REINECKE—A member of the well-known Chicago industrial design firm of Barnes and Reinecke Inc., Jean Reinecke has long been identified with plastics engineering and design. In past years his company won a total of 11 awards in MODERN PLASTICS Competitions for products in a wide range of classifications. He is respected by technical men throughout the United States.

How to enter the Competition

WHAT MAY BE ENTERED: Any plastic application which is in production and which has first reached the market since August 31, 1945.

WHO MAY MAKE ENTRY: Entry in Modern Plastics Competition is open to all plastic-using firms, designers, molders, laminators, fabricators, materials suppliers, machinery and die makers, and to others responsible for the creation or manufacture of the plastic unit entered.

NO ENTRY FEE: There is no entry fee but it is understood that all entries are to be submitted complete and in good working order, will remain the property of Modern Plastics, and may be placed in the permanent exhibit maintained by the magazine.

LARGE PIECES: Items too large for ordinary shipment, such as boats, vending machines, and juke boxes, should be entered by means of photographs and engineering drawings. If it is desired that they be exhibited for final entry, special instructions will be sent maker of entry.

CLOSING DATE: All entries must be in our offices on or before May 15, 1948, regardless of the postmarked date. The judging will take place on or about June 1.

NUMBER OF ENTRIES: Any number of different entries may be submitted by any firm or individual.

ONE BLANK PER ENTRY: If you are planning to enter more than one plastic product or part, write now to Modern Plastics for your entry blanks. A separate blank must accompany each entry except where duplicate items are submitted to show color range or where several items are to be grouped and judged as one, such as a set of jewelry, condiment sets, or other similar groups.

FULL INFORMATION: No entry will be accepted for judgment unless accompanied by a completely filled out and detailed entry blank which has been signed both with the company and individual name.

WINNERS: To be announced in the September 1948 issue of Modern Plastics Magazine. Awards will be made in accordance with plans to be announced previous to that time.

ALL ENTRIES MUST REACH OUR OFFICES ON OR BEFORE MAY 15, 1948

Classifications*

(Complete description of each group will be found in the entry form)

1. Architecture and building
2. Arts and crafts
3. Business and office equipment
4. Communications
5. Furniture and interior decoration
6. General housewares
7. Major household appliances
8. Industrial and machinery
9. Jewelry and novelties
10. Lighting
11. Packaging
12. Signs and displays
13. Photography
14. Radio and musical instruments
15. Scientific
16. Toys and games
17. Transportation
18. Wearing apparel and fashions
19. Miscellaneous
20. Informative labeling and merchandising

* Modern Plastics Competition reserves the right to make new classifications if the number of entries warrants it.

FILL OUT COUPON BELOW AND MAIL TODAY TO OBTAIN ENTRY BLANKS

SEVENTH MODERN PLASTICS COMPETITION
Sponsored by MODERN PLASTICS MAGAZINE
122 East 42nd St., Chanin Bldg.,
New York 17, N. Y.

Please send me ..... entry blanks.

Name (Company Name) .....

Address .....

Date ..... Signature .....

What the 1948 MODERN PLASTICS COMPETITION means to you

THE whole world knows the Modern Plastics Competition from previous years. Plastic buyers everywhere will await this year's selection of award winners with intense interest. The announcement of awards in the September issue of Modern Plastics and the Brochure of Entries which will be distributed to important executives who are or might consider using plastics will also receive close attention. The Display of Entries, concurrent with the Third Annual Plastics Exposition in New York City in September, will be studied by thousands.

Every entry will be indexed with full credit to all parties who have contributed to the production. Buyers for chain and department stores, purchasing agents for manufacturing organizations and engineers from industry will find at this exhibit full information on each product.

Manufacturers, molders, fabricators, laminators, designers, raw material suppliers all have a stake in this event.

Following the Competition travelling exhibits of award-winning items will tour the United States and other countries attracting the interest of additional hundreds of thousands. These travelling exhibits will also be indexed as to credits.

During and after the Competition, world wide publicity will build and maintain interest in the industry's participation. Thousands of news stories in magazines and newspapers, timely radio comment, and information in other media will bring priceless publicity to award winners.

The award symbol will remain for all time tangible evidence of excellence.

Don't delay! Fill out the coupon on the previous page today and put it in the mail.

EMBEDDED in ACRYLIC

Commercial application of a process developed pre-war on a small scale now makes possible displays with a jewel-like appearance

All the parts of a watch, down to the last screw, are sealed in this acrylic block to make a highly effective jeweler's window display

EVER since Dr. Charles E. Sando of the U. S. Department of Agriculture first successfully embedded plant specimens in methyl methacrylate, this principle of permanent preservation has been used on a small scale by medical laboratories, universities, and museums. During these dozen years, medals, animal tissue, botanical specimens, and other items both delicate and rugged have been so treated.

Because of the cost and the amount of hand labor involved, the process did not lend itself to even limited commercial application until 1940, when Vernon-Benshoff Co., Pittsburgh, Pa., cooperating with Rohm & Haas Co., developed an acrylic material and a method which made the proposition commercially practical. One of the first customers for the embedding service was the Hamilton Watch Co., Lancaster, Pa., for whom a number of castings were made containing the parts of a watch—gears, pinions, jewels, hair springs, and all. The watch manufacturer was most enthusiastic about the job because it gave his technical and sales departments permanent, clear, and non-shattering "exploded" exhibits of his product. The castings possessed a jewel-like appearance in keeping with fine watch quality.

The commercial application of the process stopped right there, because war-time shortages and allocations of acrylic materials prevented its fuller exploitation. But at least the war period allowed for observing the stability and unchanged clarity of the castings.

The proved durability of those pre-war pieces has now led to the promotion of the process by Vernon-Benshoff on a commercial basis.

Watch plus decoration

The Hamilton Watch Co. naturally became an early post-war customer. The castings illustrated herewith are for display and study purposes. One large casting on a fabricated stand contains a lady's watch complete with strap and a floral arrangement which lends an added luxury note. These are to be used by retail jewelers as window displays.

International Silver Co. has placed orders for many units to contain single samples and groupings of its sterling silver tableware. Lettering on these units is silk screened. The finished castings for Hamilton are engraved on the back surface and color is rubbed into the lines for identification and signature. Interna-

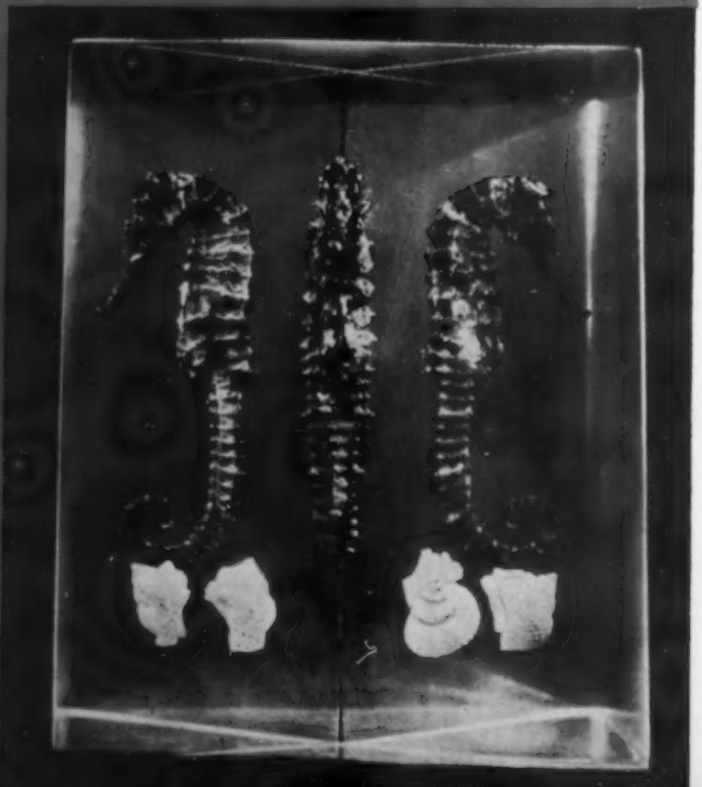
The 26-inch long block of acrylic at the left displays 18 pieces of International Sterling in various patterns

tional's displays also are for the use of salesmen and for retail stores selling the line.

Aside from the commercial value of the casting process in display work, it offers possibilities in instruction work on delicate mechanisms and in producing permanent records of the details of models or delicate equipment. For example, a valve containing many thin-walled components could not readily be sawed in two. When embedded in "Vernonite," the company's casting material, the valve can be ground, sanded, or milled down to the desired level. Only one cross-section is possible from each valve. However, by grinding from left to center on one embedded valve, and right

Even the ribbon of this Hamilton lady's wrist watch becomes part of a decorated acrylic display casting. Two separate fabricated acrylic blocks hold the display in an upright position

All sides of the fragile sea horse embedded in an acrylic prism can be seen from a single viewpoint



to center on another, matching halves or a single halved valve can be obtained. Covered by additional cast acrylic, each unit becomes a display piece.

Prismatic castings

It is advisable that castings for display or exhibit be cubical or prismatic in finish. A cylindrical casting or one with inaccurate angles will distort the optical presentation of the embedded item. When a product is embedded in a prismatic casting and placed in front of a dark background both sides and front may be seen at the same time. International Silver Co. located a number of 1847 pennies in the course of celebrating its 100th Anniversary, and had them cast in square blocks of acrylic with a prism front, so that both sides of the coins could be seen at once.

The material used for the castings is described as a pre-polymer acrylic. Practically anything suitable in shape is used as a mold. The method of placing minute objects such as watch jewels and pinions in an exactly horizontal plane in the center of a casting is the secret of the Vernon-Benshoff Co. Major problems in connection with casting are: a) assuring that the item to be embedded is completely clean, dry, and free of oil (since oil is an excellent solvent for acrylic monomer); b) assuring that no air pockets shall develop either around the items to be embedded or out in the clear acrylic; c) treating colored ribbons, watch straps, cords, etc., so that there can be no bleeding of color into the casting material. The embedding of military medals presents numerous difficulties because of the instability of the dyes in many of the ribbons.

In sculpture

Hollow castings are made by the same process, and are used for sculpture reproductions and decorative ornaments. First, a model is made of a dissolvable material which is incompatible with acrylic and will stand a higher temperature than acrylic. This higher temperature requirement is important because in the curing or complete polymerization the acrylic generates quite a bit of exothermic heat. When the casting has been made around the model, the model is dissolved out of the casting leaving the hollow form inside.

PHOTO COURTESY THE FERAGIL GALLERY

Sculpture reproductions can be made in acrylic by dissolving the model after casting is made

Size of casting is practically unlimited. The company has made pieces weighing 50 pounds. With the above limitations, practically anything can be embedded. A liquor bottle complete with its beverage inside, its foil cap, and printed label has been embedded with no difficulty—and when the casting is shaken you can hear the liquid gurgle!

Announcement concerning Plastics Stock Molds

THE CUSTOMARY PLASTICS STOCK Molds page has not been included in this issue, nor will there be such a page in the March issue.

A special editorial staff has been working on a complete revision of the Stock Molds Catalog, last published in 1944, and the stock molds listed in MODERN PLASTICS magazine since that time. This new Plastics Stock Molds Catalog is to be made a part of the 1948 *Modern Plastics Encyclopedia*. Staff work on this has been so thorough, and cooperation from molders so good, that the information filed and ready for publication is almost complete.

So we literally have no stock molds available for presentation this month or next which are not scheduled for use in the 1948 *Modern Plastics Encyclopedia*. The feature will appear again beginning with the April issue.

Versatile vinyl sheeting

by W. H. SHEFFIELD*

A NEWCOMER in the field of unsupported vinyl sheeting is markedly different in appearance and utility from other types. It is marketed as Blanchardized" "Vinylite" plastic sheeting[1]—"Vinylite" because it is Bakelite Corporation's Vinylite brand plastic; "Blanchardized" because it has a new and unusual finish developed by Blanchard Brothers & Lane in conjunction with the United States Plywood Corporation.

Until the development of the "Blanchardized" finish, the general practice had been to compound vinyl resins and coloring pigments together. The sheet as it came from the calender rolls then had the same color from front to back, and had great strength and durability. The material was therefore desirable for upholstery and was often embossed in simulated leather grains or decorated on the face so that it would more closely approximate the appearance of fine upholstery leather.

This type of material had many advantages and achieved a wide public acceptance. But from the standpoint of merchandising and utility, it had three major disadvantages: First, to manufacture it economically, it was necessary to make relatively large batches of any one color; second, if printed patterns or "antiquing" effects were applied to the face of the sheet, they were subject to abrasive wear or removal by solvents; third, when embossed and printed, the resulting sheet lacked depth and character.

In transparent Vinylite plastic sheeting, Bakelite Corp. had a material that was also strong and durable. But it was recognized that there was a need for a material which would be more versatile and better adapted to the requirements of decorators and designers. If this transparent sheeting could be made beautiful and, at the same time, capable of being produced in quantity, it would have great potentialities. To reach this end, Bakelite called in the firm of Blanchard Brothers & Lane, one of the leading manufacturers of fine upholstery leather.

Color, pattern, applied to back

The obvious thing to do was to decorate the face of the transparent sheet, but only mediocre results were obtained. After further study, it was suggested that all coloring, pattern, and decoration be applied to the *back* surface of the clear transparent sheeting. This was done and a new product was born—Blanchardized plastic sheeting.

By this method, relatively small quantities of any desired color or combinations of colors can be produced economically. Being on the back the color, "antiquing," or pattern is not subject to wear or the action of

* Manager, Decorative Wall Coverings Div., United States Plywood Corporation, New York, N. Y.

[1] The term "Vinylite" is a registered trademark. An application is pending to register the term "Blanchardized."

All the counter tops in the lingerie department of Gimbel Bros. in Pittsburgh, Pa., are made from the new vinyl sheeting. Designed by John Schurko, they are green with yellow polka dots

4-COLOR PLATE COURTESY BAKELITE CORPORATION AND UNITED STATES PLYWOOD CORPORATION

In the New York City ticket office of the Chesapeake and Ohio Railway Co., the desk tops and chairs are covered with special vinyl sheeting. The office was decorated by Dorothy Draper

solvents, and the color coating actually adds to the basic strength of the heavy transparent film. The surface irregularities produced by embossing, in combination with the coloring pigment, give a definite appearance of depth in the final product. It is a beautiful upholstery material but its sponsors wanted it to have a much wider range of usefulness.

Visualized was a product that would be ideal for wall covering, counter and table tops, luggage, etc. These uses all involved its application by means of adhesives and one of vinyl's most valuable attributes—the fact that few substances would stick to it—became its prime disadvantage. It is very difficult to get it to stick to anything else by any commercially practical methods.

At this point, the United States Plywood Corporation, which was interested in the product as an addition to its line of flexible decorative wall coverings, offered the services of its laboratory staff. These technicians were specialists in adhesives and lamination, and had years of practical experience in the commercial application of wall coverings.

Dozens of adhesives were tested. None was completely satisfactory. Because vinyl films are highly impervious to moisture and solvents, some adhesives would not set up sufficiently to develop their normal bond strength for months, if at all. Others would discolor the film if subjected to heat or ultraviolet light. Most solvents commonly used would volatilize more rapidly than the resultant vapor could pass through the sheet or the surface to which it was bonded. This caused "solvent blisters" which were difficult to repair.

The problem logically divided itself into two parts: first, bonding the vinyl sheet to porous surfaces, such as wood, plywood, plaster, or composition boards; second,

Designer Dan Cooper used decorated vinyl sheeting on wall and ceiling of his New York study

bonding it to non-porous materials, such as metals or high pressure laminates.

It was recognized that if a water-soluble or emulsion type of adhesive could be used on porous materials, solvent blisters would be eliminated. At the same time, it would be adaptable to the normal working techniques in the building field and in most shops. However, no adhesive of this type tested would adhere satisfactorily to vinyl. It became evident that some other material to which adhesives would adhere must be combined with the vinyl during its manufacturing process. Fabric was suggested but was ruled out because the elasticity and "hand" of unsupported film would be lost and the pattern of the fabric would tend to show through the finished sheet. Papers of various types were considered, but papers would tear long before the elastic limit of the film was reached. Furthermore, the final bond strength could not be greater than the resistance of the paper to delamination.

Flock bonded to sheet

The solution reached was to bond a finely cut flock to the back of the sheet during the manufacturing process after the color was applied. Suitable synthetic adhesives had to be developed for this purpose because none was available which had sufficient elasticity and which would not cause discoloration of the sheet or disturbance to the color coating. The resultant sheet can be readily bonded in the field or in the shop to most porous surfaces with emulsion or other water-soluble adhesives. When this vinyl is bonded to fir plywood, with a formulated emulsion, allowed to dry and then ripped off, the wood fails over more than 50% of the area.

The problem of bonding to non-porous surfaces proved to be more difficult. It also falls into two parts: field application where it is impractical to use heat and pressure, and shop application where hot presses are available. Again, no commercially produced adhesive submitted for tests proved to be satisfactory. It was necessary to formulate a new synthetic adhesive to give desired bond strength, yet be compatible.

For field erection to non-porous materials both the vinyl sheet and the surface to which it is to be applied are given a coat of the adhesive compound which is allowed to dry until the bulk of the solvents has evaporated. A small area of the surface is then reactivated with a dilute mixture of the adhesive. When it is tacky, the film is applied with a roller or stiff bristle brush. This process is repeated until the entire area has been covered. Good results are a matter of technique. If the reactivated adhesive is too dry when the sheet is applied poor adhesion will result. If it is too wet, vapor blisters will form.

Much more satisfactory and uniform results can be obtained when the work can be done in a hot press. The same adhesive is employed and both parts are given a uniform coat and dried thoroughly. They are then assembled, without reactivation, and placed in the press. The time, temperature, and pressure equation which gives most favorable results must be worked out experimentally for each type of material but once this is done, results are excellent.

Actual tests have shown that when Blanchardized plastic sheeting has been properly applied to metal in a hot press, the resulting laminated sheets can be stamped, rolled, or bent into various shapes, within reasonable limits, without noticeably disturbing the adhesive bond. This development, combining the strength and rigidity of metal with the beauty and durability of the sheeting, may well revolutionize the production of many manufactured articles.

Physical and chemical characteristics

The finished plastic sheeting has excellent resistance to moisture, chemicals, oils, and greases, and, if soiled, is easily cleaned. Outstanding among its features are its resistance to abrasion and its flexibility. In testing it has withstood as many as 50,000 flexes. It is easily fabricated and it has exceptional depth of beauty. Especially important in decorative use is the fact that it does not support combustion; it is self-extinguishing. It has received the approval of the New York City Board of Standards and Appeals for both upholstery and wall covering.

The versatility of this new product is apparent from the following facts: it can be printed with any design or pattern. Colors can be matched economically without difficulty. It is equally suitable for the finest upholstered furniture or as a wainscot in hospital corridors. Business firms have used it in their offices and reception rooms. Department stores have found it to be ideal for counter tops and for use on columns and in stairhalls where heavy wear is encountered.

Light where you need it

Polystyrene lamp uses phenolic, urea, and vinyl for wire, plug, switch, socket

Clipped to a book, this lamp throws light on pages without lighting up the rest of room

CIVILIZED human beings fall into two classes: those who like to read in bed and those who do not. Somehow there seems to be one person of each type in every married couple. The latest solution to the resultant problems is the Klip-On lamp, which is designed to throw light on a book without lighting up the rest of the room. The lamp can be used as a night light, on trains, in hotels, and by patients in hospitals.

Four polystyrene parts make up the body of the lamp, which also uses vinyl, urea, and phenolic in its electric wire, plug, switch, and socket. Stapleton Industries, Inc., Cleveland, Ohio, is the manufacturer of this lamp.

The four polystyrene parts are: the shaft, the back plate, the shade, and the small button on the end of the metal clip. Vlchek Tool Co., Cleveland, Ohio, molds these parts in an eight-cavity combination die, producing the parts for two lamps in each shot. General Electric furnishes the 10-watt intermediate base bulb, the Monowatt switch, and the 8-ft. Flamenol cord. The phenolic socket is made by Union Insulating Co., Parkersburg, W. Va.

Seven steps in assembly

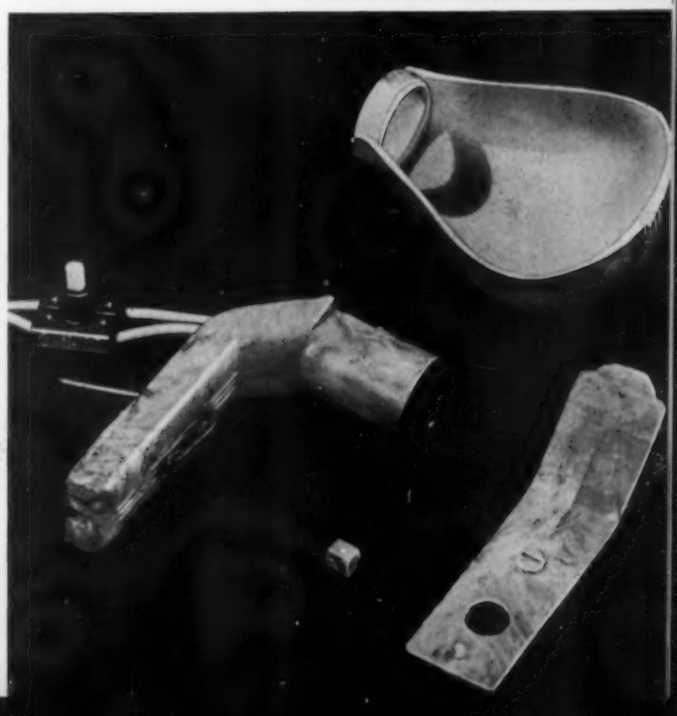
Stapleton Industries assembles the Klip-On lamp on a seven-station assembly line. The first operation is to spray Japan white on the inside reflecting surface of the lamp shade. At the same time a second worker attaches the switches to the electric cords.

The cord, with switch attached, is then threaded through the sleeve in the lamp shaft, soldered to the socket, and the socket inserted into the sleeve. After the socket is in place, the shade is cemented to the lamp shaft at a fourth assembly station.

The fifth step is to cement the back plate in place. The metal clip is then inserted, and the small polystyrene button is cemented on the end of the clip to prevent the clip from coming out.

At the final station on the assembly line, the bulb is put into the socket and the lamp is tested. The same operator then packages the finished lamps in individual cardboard containers.

Disassembled lamp shows polystyrene shaft, back plate, shade and button, phenolic socket

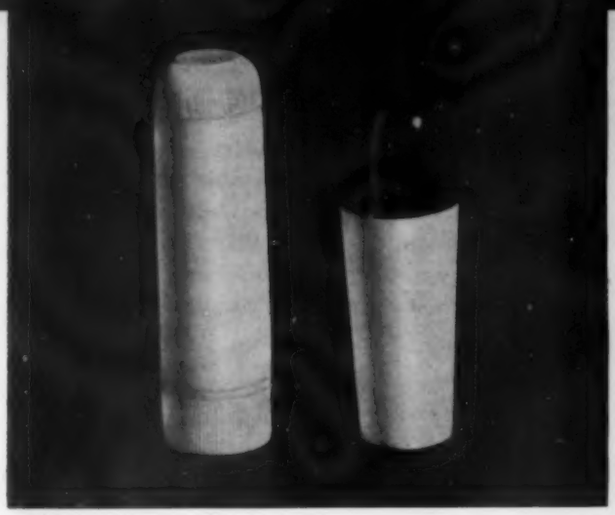


Slots between the bristle rows of this Lumarith brush back facilitate cleaning, for soap and water can be run through the brush. Use of cellulose acetate enables the Prolon Plastics Div., Pro-phy-lac-tic Brush Co., 221 Pine St., Florence, Mass., to produce a low cost brush without sacrifice of design or quality. These brushes can be supplied in blue, pink, green, or crystal

PLASTICS PRODUCTS

For free-handed telephoning in office or home is this Rest-A-Phone manufactured by Rest-A-Phone Co., Box 8788, Portland, Ore. The curved Tenite II shoulder piece is padded on the underside and may be flexed for proper fit. The telephone is held in the bracket by a metal strip which snaps over retainers on the bracket ends

Fluorescent light shields of multiple-color extrusions of Lumarith produce a decorative effect which cannot be gained any other way, either by colored fluorescent tubes or extruded cylinders. Wound as shields, these extrusions are manufactured under the name of "Plasticoils" by Schwab & Frank, Inc., 2939 E. Warren St., Detroit 7, Mich. They have permanent, molded-in colors and are available in a variety of color combinations



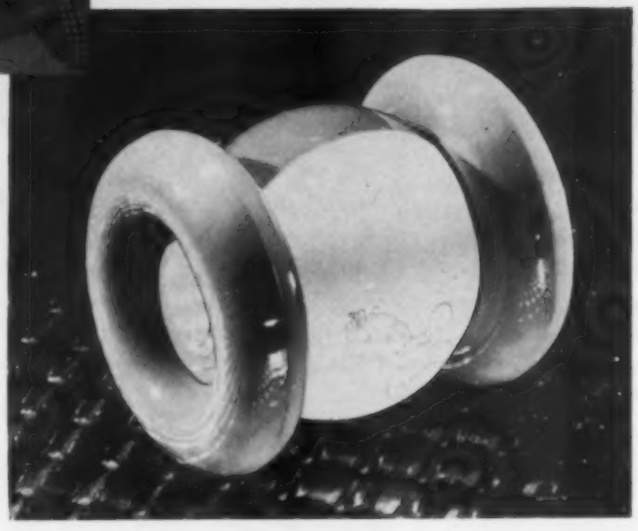
Particularly suitable for products using a printed label, this straight-sided or "torpedo" inhaler at left has been added to the line of stock inhalers put out by the Closure & Plastics Div., Owens-Illinois Glass Co., Toledo, Ohio. Body, nosepiece, and cap are compression molded of urea-formaldehyde. An earlier style "bullet" inhaler is at right

Magnets in the base will keep this new Lustron cigarette holder upright on steel surfaces. Molded in one piece by Kohler-Kraft Plastic Products Co., Fenton, Mo., for Skinner & Kennedy Co., of 416–418 N. Fourth St., St. Louis 2, Mo.

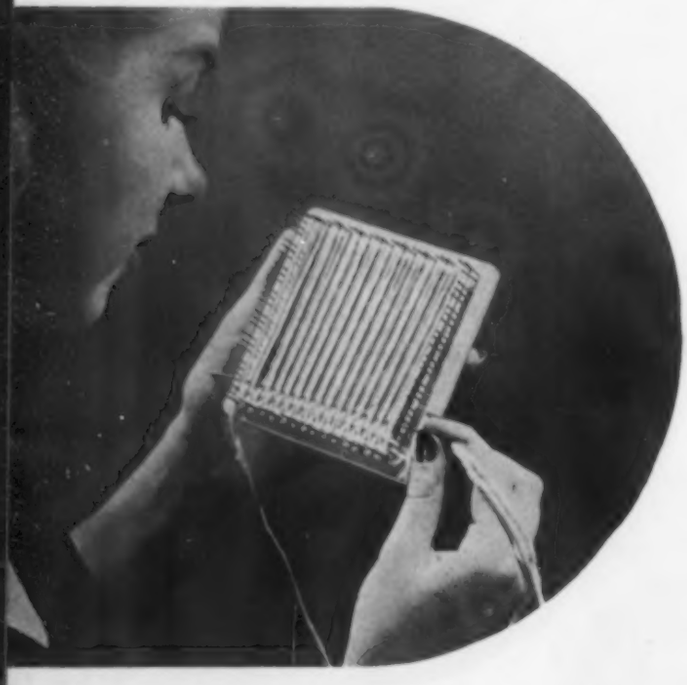
Built-in supports in the base of this Lustron flower pot cover keep the inner clay pot away from the bottom of the outer shell and provide a water reservoir from which the plant can draw. These Flex-O-Ware pots are manufactured by Robinson Industrial-Crafts Ltd., of London, Ontario, in solid colors or marble tones. They are dripless, requiring no saucer to protect furniture, shelves, and floors from stains caused by seepage of water

Appliances used in hairdressing salons must be able to take considerable wear, be impervious to various chemicals common to that line of work, yet be attractive and clean in appearance. Fulfilling all these requirements is this new one-piece urea-formaldehyde housing for the Nestle Fleetwave permanent waving machine put out by Nestle-LeMur Co., Meriden, Conn. The housing is molded by the Plastics Div., of General Electric Co., 1 Plastics Ave., Pittsfield, Mass.

An improved three-dimensional viewer which gives the same depth perception to 35-mm. film as grandfather's stereoscope, makes use of Plaskon in the viewer housing and case. The housing is molded by Barber-Colman, Rockford, Ill.; the case by the General Electric Co., Fort Wayne, Ind. Marketed by Tru-Vue, Rock Island, Ill.

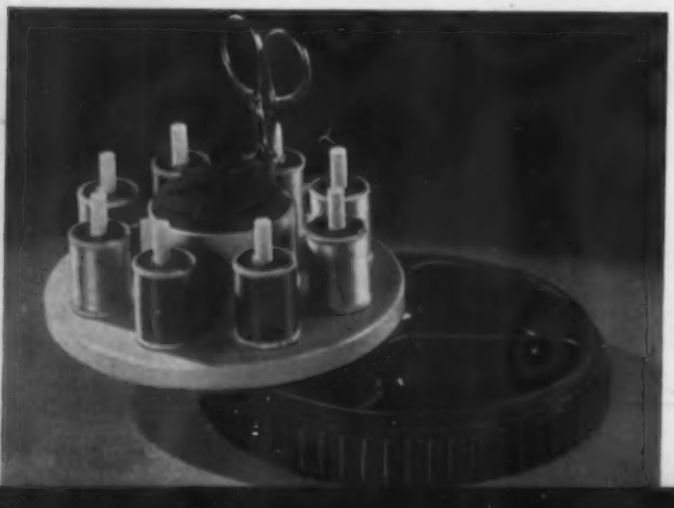


Push it way and it'll roll right back again with a rattle that will keep a toddler intrigued. Of red, white, and blue Tenite, the Tu-An-Fro Roller Back Ball is manufactured by Thomas Mfg. Corp., 80 Clinton St., Newark 5, N. J. The center section contains a spring mechanism



Hobbyists can have a field day with this weaving frame, injection molded of ivory-colored Celcon by Northern Industrial Chemical Co., South Boston, Mass., for Donar Products Co., Winchester, Mass. The miniature loom has pegs lined up on four sides of the ethyl cellulose square. A needle carries yarn around the pegs and back again

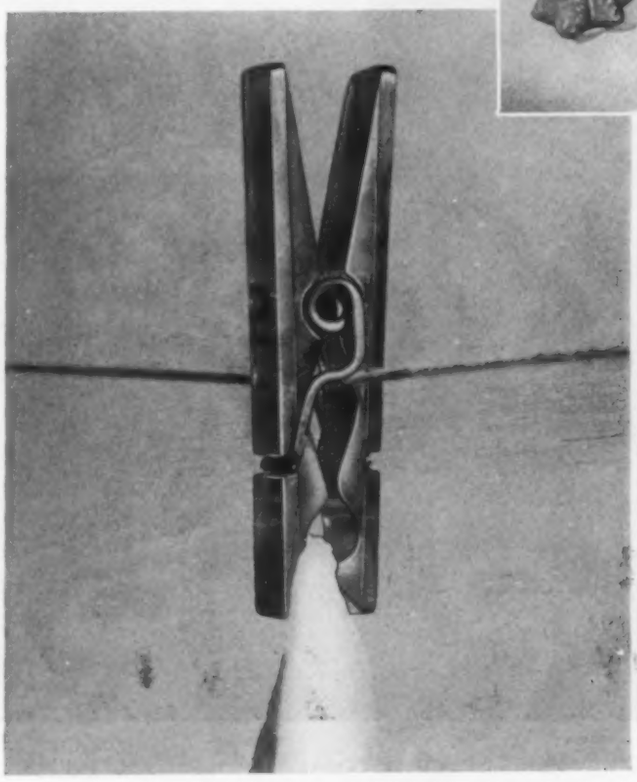
Light is thrown on the subject by this phenolic unit that holds the telephone, a calendar, note paper, and pencil. It is lighted from within by a 7-watt bulb. Molded by Tech-Art Plastics Co., 41-01 36th Ave., Long Island City, N.Y., for Lite-A-Phone Corp., 1186 Bdwy., New York, N. Y.



Replacing buttons, mending rips take less time when there's a Sew Handee Kit around the house. Molded in red and ivory polystyrene by Best Plastics Sales Co., Inc., of 140 Cedar St., New York 6, N. Y., the kit is 3¾ in. high and 6 in. in diameter. It can hold eight spools of thread, a pair of scissors, and pin cushions

PLASTICS PRODUCTS

The flowing lines of Cloverware spoons, and nut and bonbon dishes, made possible through the use of acrylic, harmonize with either modern pottery or traditional china. These pieces, designed by Eva Zeisel, are produced by the Clover Box & Mfg. Co., 816 E. 140th St., New York, N. Y., in translucent white, transparent amber, or green Plexiglas. They are hand blown by a process which prevents contact between the plastic and mold surfaces



Clothes never touch a rusty or soiled clothesline when they are attached with this new deep-throated Naltex polystyrene clip, injection molded by Nalle Plastics, Inc., 108-10 W. Second St., Austin, Texas, in a variety of colors. As safeguard against rusting, the steel springs are zinc-plated

Light weight plus durability are "built into" this cellulose acetate butyrate phonograph arm manufactured by V-M Corp., Fourth & Park Sts., Benton Harbor, Mich., for the Stewart-Warner Corp., 1826 Diversey Pkwy., Chicago 14, Ill. It is molded by Modern Plastics Corp., Benton Harbor, of Tenite II

PHOTO COURTESY U. S. NAVY

Aircraft carrier decks must be hard and splinter-proof. Experimental compregnated wood deck took over 18,000 arrested landings without showing any serious wear

COMPREGNATED WOOD TESTED BY NAVY

by ROBERT P. GOODALE*

THE OLD expression "iron men and wooden ships" still retains a lot of its meaning in our modern Navy. For many reasons, wood decking is used on certain portions of ships and, in particular, on aircraft carriers. Burma teak has long been the preferred wood for decks and other purposes where a hard, splinter-proof material was needed. Imported from the East Indies, teak became more and more difficult to secure after the outbreak of the war and, as demands for teak exceeded available supplies, the Bureau of Ships asked industry for help in providing a suitable replacement.

The aid of the Forest Products Laboratory, Madison, Wis., was enlisted and Dr. Alfred J. Stamm initiated a test program to determine the value of compregnated wood as a decking material. Compregnated wood, usually called "compreg," is wood which has been impregnated with synthetic resin and cured under high pressure. This technique had been developed by the Forest Products Laboratory as one phase of a wide investigation of both the properties and the utilization of wood.

Compreg combined the most desirable features of such woods as teak with others not exhibited by any natural wood and seemed to be an ideal material for ship decks. The special properties of compreg arise from the transformation which takes place when synthetic resin and wood are combined. In the impregnating process, synthetic resins are forced into the voids in the wood or spaces between the wood cells. The impregnated veneer, after drying, is laid up in an assembly of the desired thickness and then bonded in a hot press under high pressure. The result is a material which is neither wood nor plastic but a combination of both in so far as strength properties are concerned. The impregnation and densification of the veneer minimizes splitting and, at the same time, increases the wearing quality of the product.

* The Resinous Products & Chemical Co., 222 West Washington Square, Philadelphia 5, Pa.

The resistance to splitting was a particularly important consideration for aircraft carrier decking since flying splinters can be as dangerous as shrapnel or may puncture a tire, wrecking a plane as it lands. Also, when a plane is "shot-up" in combat, wheels or landing apparatus may be damaged, necessitating a "belly" landing. The metal propeller and the undercarriage of the plane dig into the deck and only a very dense material can resist this treatment with a minimum of damage.

Dimensional changes resisted

Compregnated wood also resists dimensional changes far better than ordinary wood. The wood does not swell and shrink upon exposure to moisture or prolonged dryness and heat. This was another point in its favor since Navy ships may be in the Aleutians today and, a few days later, in the tropical heat of the mid-Pacific. In addition, the impregnation process improves the surface qualities of the wood, making it less absorbent and easier to maintain.

The Navy had specified that the decking be 2 by 8 in. by 15 ft. 10 inches. Working with the Blue Jay Aeronautical Co., Madison, Wis., an experimental deck plank was designed which met the Navy requirements satisfactorily. It consisted of a top surface of compregnated wood bonded to normal redwood. A quantity of this wood sufficient to form a large area on a flight deck was made and installed on a carrier in 1944. After several months of continuous use the report came back that the decking was standing up excellently. Some 18,000 arrested landings have been made on this deck without evidence of serious wear. Apparently, a satisfactory material for decking had been devised thanks to the skill of wood technologists, but before the Bureau of Ships could give its full approval it was felt that further tests should be conducted to confirm the first encouraging results.

The practicability of using compreg could be determined only by actual full scale use. Based on the first compreg decking, tentative performance specifications were drawn up and a contract for large scale production of the experimental decking was awarded to the American Plywood Co., New London, Wis.

Precise control needed

The manufacture of compregnated wood involves precise control over a number of variables and the skill of the operator is reflected directly in the quality of the final product. The theory of wood impregnation is that a synthetic resin is forced into the voids and wood cells and then is cured in situ. The American Plywood Co. had carefully investigated this work and, after testing a number of resins, selected as the impregnant an aqueous solution of a phenol formaldehyde resin containing approximately 55% solids. This is a low-condensed resin designed to provide the maximum impregnation and to impart a high degree of dimensional stability to the final product. The resin is usually diluted with water to form a solution of 25 to 30% solids.

Bass wood chosen

Bass wood veneers of 1/8 in. thickness were chosen for the experimental decking since this wood has a straight grain and is of medium texture, Its moderate strength properties are offset by its uniform absorption of the resin and general ease of handling. Various methods of impregnating were tried and it was finally found that immersion in an open tank provided adequate resin pick-up. The standard procedure which was adopted is as follows: The bass wood veneers, 8 in. wide by 100 in. long, are lowered on a rack into the resin solution where they are soaked at room tempera-

Planking has 3/8-in. compreg top, 1-in. redwood core, 1/8-in. compreg, and 1/2-in. redwood

WOOD THAT LASTS LONGER

Improved wood, produced through the resin treatment described in the accompanying article, has undergone grueling tests on aircraft carrier decks. The many advantages offered by this compregnated wood open up increased possibilities in such non-military uses as in the textile field for picker sticks, bobbins, and shuttles; in the electrical field for insulating purposes; in housing for stair treads and flooring exposed to severe wear; and in such diverse applications as desk tops, handles for cutlery, and decorative panels.

PHOTOS COURTESY AMERICAN PLYWOOD CO.

Bass veneers 1/8-in. thick are lowered into an open tank containing a 25% solids solution of a phenolic impregnating resin. Approximately 18 hr. is necessary for the veneers to pick up 100% by weight or 25% dry resin

After the veneer has been soaked with the impregnating resin, it is hoisted above the tank and allowed to drain for about 30 min. It is then racked in sticks on a skid (above) and put in a dry kiln at 160 to 170° F. for 18 hr. to reduce the volatile content before bonding

ture for approximately 18 hours. The veneer pick-up is 100% by weight or 25 to 30% dry resin based on the weight of the veneer.

After soaking, the rack of veneer is hoisted above the tank and allowed to drain for approximately one-half hour. Then the veneer is racked on sticks on a skid and placed in a dry kiln at 160 to 170° F. for 18 hours. This reduces the volatile content to 2% or lower, which is essential in order to avoid blistering or an uneven surface of the final compreg when it is removed from the hot press without cooling.

The dried, impregnated veneer is coated with a very low spread of a hot-press phenolic adhesive which is characterized by a long flow period at moderate temperatures and fast cure at normal pressing temperatures. This resin was selected because of its excellent bonding qualities with impregnated wood.

For the decking, compreg wood of two thicknesses was required. For the first, five plies of the veneer are pressed from an original thickness of 5/8 to 3/8 in. in a hot press at 300° F. for 30 min., at a pressure of 300 p.s.i. After the first 5 min. of hot pressing, the press is opened momentarily for breathing or escape of volatiles entrapped in the assembly and then closed again for the remaining 25 min. of the cycle. This practice insures compreg of uniform surface. Compregnation is based on the principle of curing the resin within the wood fibers while the wood is under compression, thus stabilizing the wood and preventing return to its original dimensions. The second compreg unit consists of two plies of the impregnated veneer which are bonded under the same conditions outlined for the first unit. The veneers are compressed to a final thickness of 1/8 inch.

The design of the planking involves a composite construction, assembled as follows: The 3/8-in. compreg is the wearing surface, next is a 1-in. thick normal redwood core, then the 1/8-in. compreg, and, finally a 1/2-in. normal redwood board.

Plies scarfed before assembly

The Navy required deck planks of 15 ft. 10 in. in length which necessitated scarfing of the individual plies before the final assembly. After each ply has been scarfed, the hot-press phenolic adhesive previously mentioned is applied and the scarfs are bonded in a special hot press. Characteristics of the adhesive are such that the spread veneers may be allowed to dry and then bonded at any convenient time thereafter.

Because of the thickness of the assembly it is not practical to use hot pressing, so a moderate-temperature setting resorcinol-type adhesive of high water resistance is used. The adhesive is spread at the rate of 50 lb. of liquid glue per 1000 sq. ft. of joint. The laid-up assemblies are placed under a pressure of 125 to 150 p.s.i.

The dried, impregnated veneer is then coated with a low spread of a hot-press phenolic adhesive, selected for its excellent bonding qualities with impregnated wood. The adhesive produces bonds at moderate temperatures which are water-resistant and also strong mechanically

A circular saw is set to cut a taper of 10 to 1 so that individual plies can be scarfed. Scarfing of the plies before final assembly was necessary in order to meet the Navy requirement that planks be 15 ft. 10 in. long

and kept under pressure overnight, at 160° F., with sufficient humidity in the press room to provide a wood moisture content of 10%.

Standard tests are run to insure conformance with specification requirements. Resistance to splintering must be at least 25% greater than that of Douglas fir; specific gravity shall be approximately 0.52; and after soaking, freezing, and drying cycles the decking shall show shear values at least as great as those listed in Table I. The soaking cycle consists of: 1) 48 hr. immersion in a 4% sodium chloride solution. 2) 24 hr. at −25° F. 3) 24 hr. at 120° F. and 50% relative humidity. 4) 8 hr. at −25° F. 5) 16 hr. at 120° F.

How decking is installed

On aircraft carriers, the decking is laid athwartship rather than fore and aft. The edges of the deck planks are slightly tapered and when the bases of the planks are tightly butted, a narrow slit is left between the upper edges of each plank to be caulked.

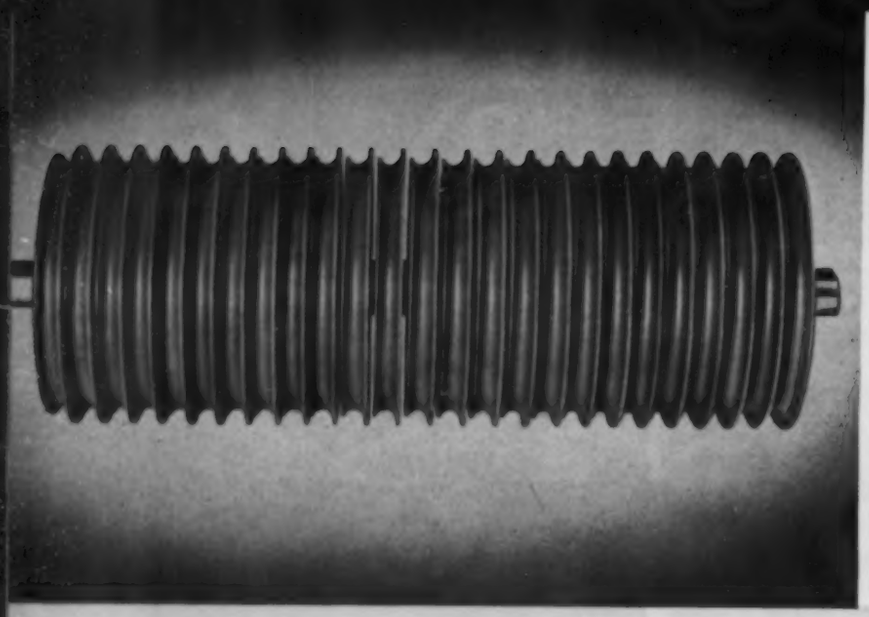
In order to hold the planks to the metal deck, studs are spot welded to the steel deck at regular spaced intervals. Holes are drilled through the wood decking to allow for the passage of the studs and the nut is countersunk by drilling a larger hole in the same opening. In the case of the compreg decking, the nut reaches the second layer of compreg, which serves as a bolting shoulder and resists the compression which normally would result if only redwood were used.

When the decking has been fastened in place, white lead is placed in the bolt holes and a tapered wooden plug driven into the hole.

The service reports which have been received to date indicate that the new decking is superior to other types which have been investigated, although it is inferior to teak in wearing qualities and heavy or concentrated loads will cause surface impressions in the compreg. On the basis of performance which the first installation of experimental decking has shown, however, a new use for compreg is being recognized in ship decking specifications now under preparation by the Bureau of Ships.

Table I.—Shear Strength of Compregnated Wood

Before soaking and drying cycles:		
2/8-in. compreg face to 1-in. redwood core	1/8-in. compreg to 1-in. redwood core	1/8-in. compreg to bottom redwood
1100 p.s.i.	600 p.s.i.	1100 p.s.i.
After soaking, freezing, and drying cycles:		
900 p.s.i.	600 p.s.i.	800 p.s.i.
Holding power on boltheads shall be not less than:		
Maximum load		2200 p.s.i.
Proportional limit		1200 p.s.i.
Deflection		0.09 in.



1—*A group of mounted "Dobby" loom sheaves molded of cotton-seed hull filled phenolic. They are self-spacing and self-ventilating*

2—*Unmounted sheaves of same type as in Fig. 1, showing air-circulating "spokes"*

Textile mill problems solved

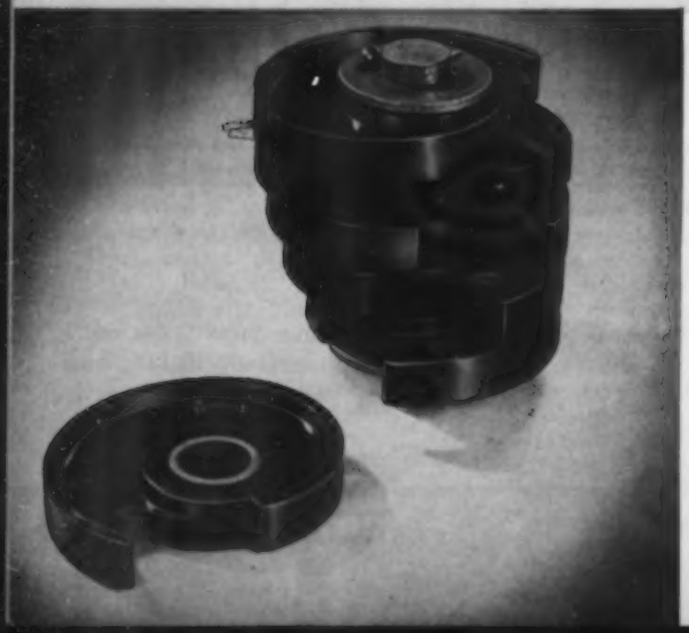
A case history shows that, once a plastic machine part had proved itself, demand for other parts followed automatically

WITHIN a day's automobile ride of Knoxville, Tenn., are 1500 textile mills. Their managements are conservative in matters of equipment innovation, but are also highly conscious of "down-time," maintenance costs, and the importance of faster production.

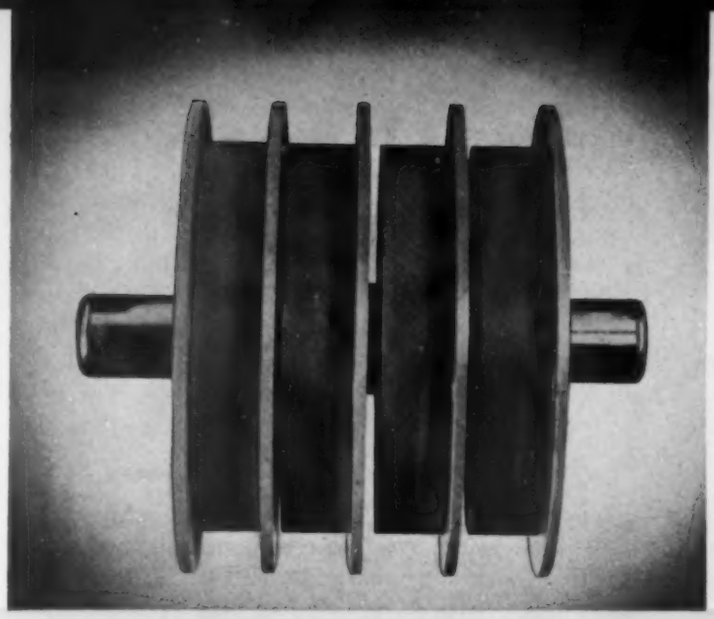
Selling against the conservatism of mill management, but producing plastic textile machinery components designed to overcome many of the above-mentioned management problems, is National Plastics, Inc., in Knoxville. The company's first item, a plastic sheave or pulley component, took several years for introduction; then, once this item had established itself, the company was requested to produce other parts from plastics.

The material used in most of these items is phenolic formulated and compounded by the company, using cotton-seed hulls as filler. Developed originally at the

5—*Another type of Cam loom sheave in which plastic replaced wood and eliminated much spoilage of cloth*



6—*Tape tension idler with center bearing stood up under grueling test of 50,000 hr. of continuous operation*



3—Originally made of wood, these plastic Cam loom sheaves with self-lubricating bearings have many advantages

4—Two unmounted Cam loom sheaves before the oil-impregnated bearings were inserted in center holes

University of Tennessee by Dr. Fritz Rosenthal, the exclusive license for the managing and sale of this compound, known as "Plastone A," was issued to National Plastics. The molding compound is declared to have physical characteristics higher than those of most general purpose phenolics, and has some price advantage.

Sheaves for looms

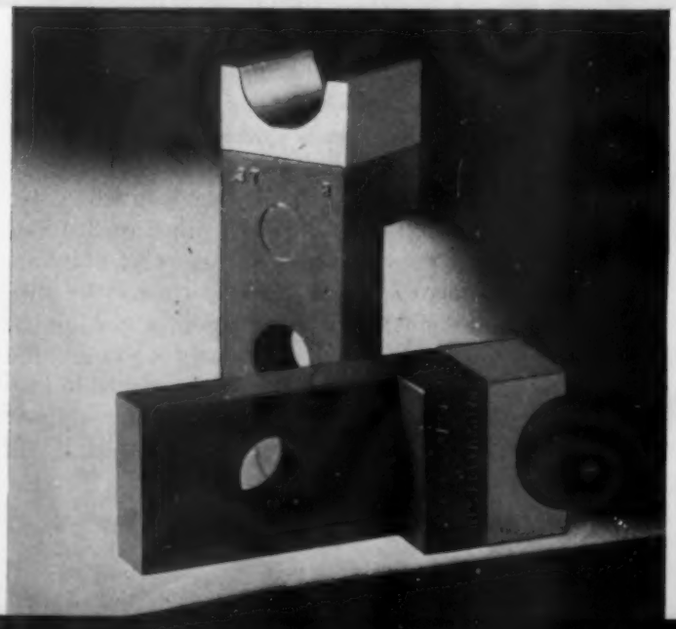
Figures 1 and 2 show sheaves designed for Dobby looms for making fancy goods, the sheaves being shown mounted and unmounted. The molded "spokes" in these and other sheaves aid in circulating air through the assembly so that the pulleys run cooler. Figure 3 shows a mounted group of sheaves used on Cam looms, and in Fig. 4 are two unmounted sheaves.

Another type of Cam loom sheave made of plastic is shown in Fig. 5. These sheaves were originally made of wood, and the oil used for lubrication would frequently drip onto the cloth being woven on the loom. Further, the oscillating motion of one sheave against another wore the wood pulleys, causing fine wood particles to fall into the fabric. This resulted in both machine downtime and loss of yardage due to cloth spoilage. Wearing of the wood against the metal shafts would throw the sheaves, and hence the warp of the fabric, out of line and cause excessive wear on the cords and straps which operated the weaving mechanism of the loom.

The new plastic sheaves have self-lubricating bearings which are also self-aligning. Having no grain structure, the plastic will not chip when properly installed and affords longer life for the cords and straps on the looms. Shoulder extensions of the bearings make spacing automatic and reduce face friction.

A tape tension idler for spinning machines is shown

7—Cloth roll bearing in which the self-lubricating head, mounted on a plastic holder, can be replaced when worn



8—Placed between spinning spindles, this separator has a flexible wing made of phenolic-cloth laminate

9—Quills used in spinning machines are equipped with plastic tips which do not tear the yarn, can be made in different colors to "code" the twist or size of yarn

10—Plastic has replaced iron and fiber in binder posts and bushings (below); new parts use a special lubricant, run cooler, reduce fire hazard

in Fig. 6. Here plastic replaces stamped metal from which the idlers were formerly made. The metal idlers were mounted on a hardened shaft which extended on each side to wooden block bearings. As these bearings wore, the idler became out of plane; also, the metal idlers sometimes rusted, causing tape wear. The present idler, for which a patent has been applied, has just completed tests of 50,000 continuous hours of operation under a 25-lb. load at 3800 r.p.m. with only 0.003-in. wear on the diameter. It was still running perfectly when stopped.

Collects limited amount of lint

The shaft in the new idler remains stationary in the blocks, the bearing being at the center of the molding. Since the idler rotates in a plane approximately 15° off perpendicular, the bearing has a longer life because of the gyroscopic action provided by rotation; when the idler is running at the required speed, it is held truly in plane, and bearing wear is reduced to a minimum. The plastic is not subject to oxidation and its smooth surface will collect only a limited amount of the lint so prevalent in the mills.

Shown in Fig. 7 is a cloth roll bearing which is taking the place of fiber. The mills have found that when fiber bearings are lubricated with oil they tend to defoliate. Also, when a heavy roll was removed from a loom, bearings were frequently damaged to the extent that new ones had to be installed. These block bearings with plastic holders have self-lubricating powdered bronze bearing heads which are self-aligning. If a bearing is damaged in any way, the plastic holder remains in service. It is only necessary to replace the metal bearing head.

Separators absorb vibrations

Figure 8 shows a separator which goes between spinning spindles to prevent yarn being wound on one spindle from becoming entangled with yarn on the spindle next to it. With an acetate foot and a phenolic cloth laminated wing, this new separator replaces metal separators which oxidize in high humidity, thus staining the yarn, and frequently break because of the vibrations of the spinning machinery. The plastic separators are flexible enough to absorb the vibrations of the spinning frame; if passing carts brush against them they will not break off. There are between 240 and 300 separators to a spinning frame; the plastic separators give a 50% weight advantage over metal separators. This is an important power saving factor since the separators on the frame must be raised and lowered as the yarn winds around the spindle.

The problem of worn quills has been overcome by National Plastics through the use of plastic tips, shown in Fig. 9. These tips, made of acetate or nylon, present no rough edges to tear the yarn, permit old quills to be brought to their proper length, and since they are available in various colors they may be used to designate the twist or the size of the yarn on different quills. The tips may also be installed on new quills as well as on worn ones.

Fire hazard reduced

Figure 10 shows a binder post and bushing, part of the mechanism for the brake to stop the motion of the shuttle. Old type binder posts were made of cast iron with fiber bushings. The friction of the bushing against the cast iron post would cause excessive heat and wear, sometimes creating fire hazards. The plastic binder post and bushing (the bushing is a laminated tube) uses a special lubricant, the action of which is assisted by the high humidity which is prevalent in cotton mills.

Currently under development by the firm are temple rolls, pickers, shuttles, top rolls, and other applications of plastics to textile machinery. Aware of the hazardous conditions to which plastic parts will be subjected in textile mills, and the necessity for making the best use of the functional characteristics of plastics, the company will not permit any item to be placed in production until positive that it will do the job for which it is intended, and do it better than the part which it will replace.

The IMPCO Type VF Machine on the Job for *Noma*

THESE photographs show urea compound being molded by compression on an Impco VF 822 machine.

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IMPROVED PAPER MACHINERY CORPORATION

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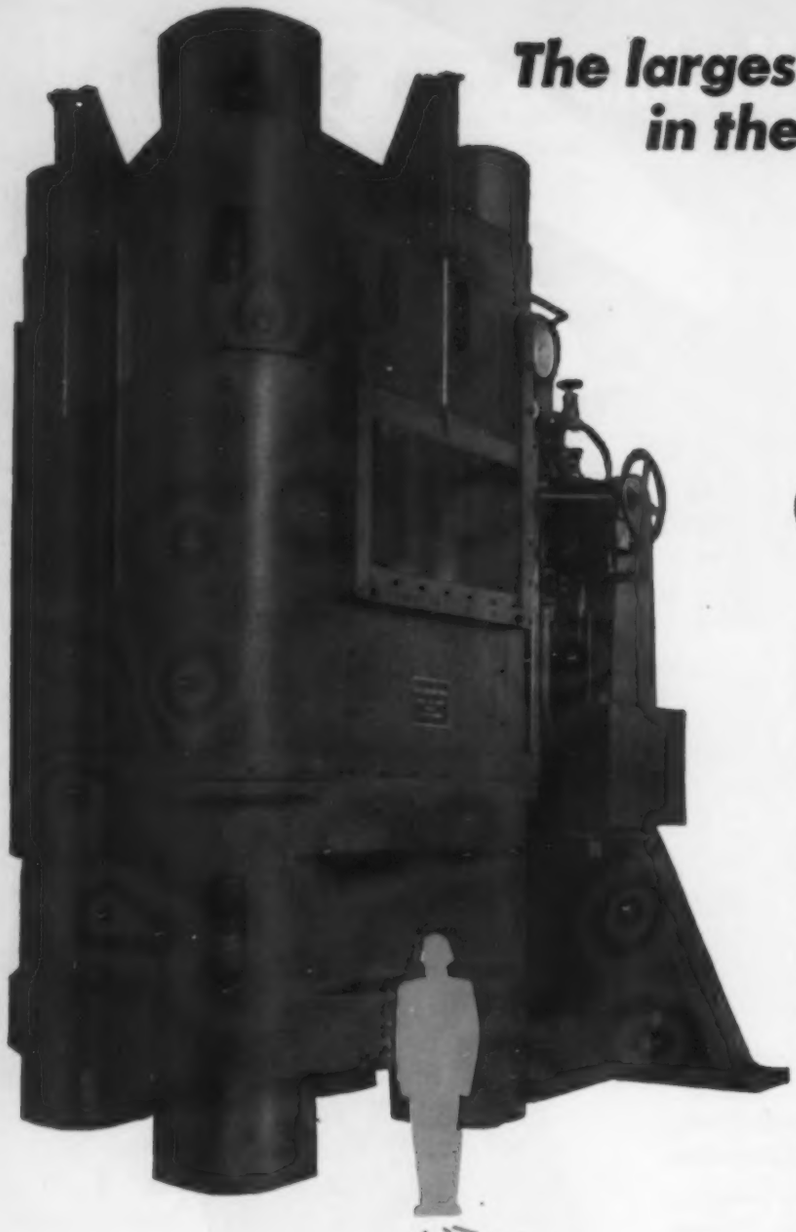

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Plastics in business machines†

by R. G. CHOLLAR‡

ALTHOUGH it is often dangerous to generalize on the implications behind any comparison of two major fields of materials, a number of proved engineering facts of widespread utility can be gleaned from a consideration of a few typical applications of plastics and metals in the field of business machines with which the author is associated. For convenience, the outstanding properties of importance in any comparison of metals and plastics for use in engineering applications are given in Table I. (*Please turn to next page*)

* Reg. U. Patent Office.

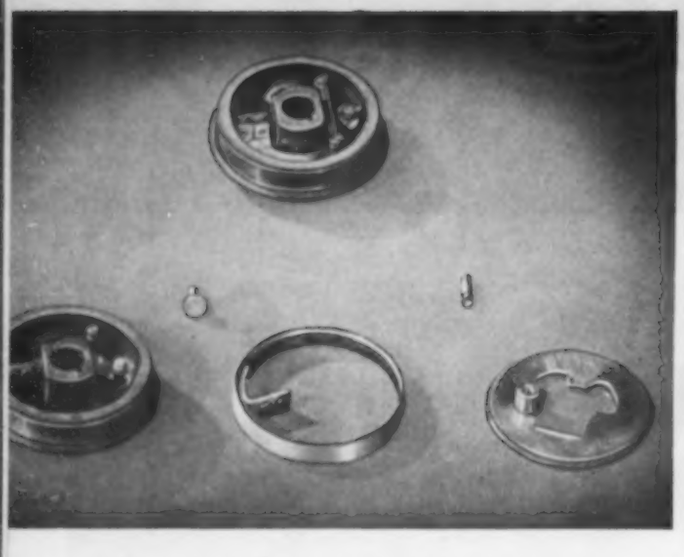
† Presented at a symposium conducted by A.S.T.M. Committee D-20 on Plastics at Cincinnati, Ohio, and published here in abridged form through the courtesy of that society.

‡ National Cash Register Co., Dayton 9, Ohio.

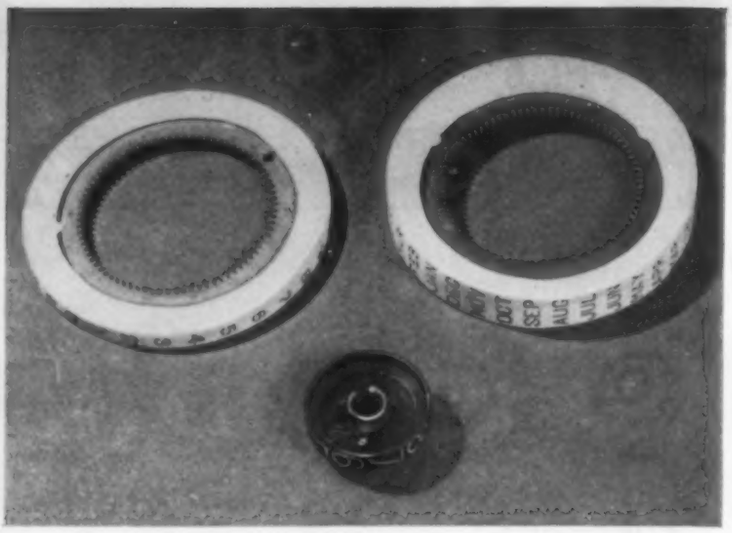
Table I.—Comparative Properties of Plastics and Metals

	Specific gravity	Comparative cost	Comparative hardness	Comparative shock resistance	Tensile strength, p.s.i.	Linear thermal expansion, 10^{-5} per °C.	Thermal conductivity, 10^{-4} cal./sec. per sq. cm. per °C. per cm.	Heat distortion temperature at 264 p.s.i., °F	Dielectric strength, volts/mil.	Modulus of elasticity, 10^5 p.s.i.	Damping capacity	Deformation under 4000 p.s.i. load at 122 °F. for 24 hr., %	Water absorption, 24 hr., %	Color possibilities
Phenolics (molded)	1.4	5–10	45	1–33	5,000 12,000	3.0	4–7	275	250–400	7–15	High	0.4	0.4–2	Limited
Phenolics (laminated)	1.4	18–24	33	3–48	5,000 15,000	1.5	5–8	>325	200–700	7–30	High	Low	1–5	Limited
Glass laminates	1.7	33–40	40	25–130	40,000 50,000	0.6	3–5	>320	450–650	20–25	High	Low	0.3–0.6	Limited
Ureas	1.5	10–14	48	1.0	5,000 13,000	3.0	7.0	275	300–500	12–15	High	0.55	1–3	Unlimited
Vinyl chloride-acetates	1.4	16–23	18	1–2	6,000 10,000	6.9	4.0	130	400	4	High	1–20[a]	0.1	Unlimited
Methyl methacrylates	1.2	28	26	1–2	6,000 10,000	8.0	4–6	140–200	500	3–6	High	2–12	0.4	Unlimited
Polystyrene	1.1	9–14	20	1–2	5,000 9,000	7.0	2–3	160–180	500–700	2–6	High	0.5–5	0–0.05	Unlimited
Polyamide	1.1	53	26	4–6	7,000 10,000	10.0	6.0	170	375	3–4	High	4.0	1.5	Unlimited
Cellulosics	1.2	14–24	10	2–38	2,000 10,000	12.0	4–8	110–215	250–600	0.5–4	High	1–65[a]	1–6	Unlimited
Steel	7.8	1–17	120–800	17–300	40,000 250,000	1.26	1150	1000[b]	Conductor	280	Low	Nil	0	External applications
Aluminum	2.7	5–8	30–115	8–65	13,000 76,000	2.40	4800	460[b]	Conductor	103	...	Nil	0	External applications
Magnesium	1.7	7	40–95	3–30	20,000 48,000	1.43	2500	450[b]	Conductor	65	Inter-mediate	Nil	0	External applications
Zinc	7.1	4–5	70–100	105–140	30,000 52,000	2.63	2700	...	Conductor	124	...	Nil	0	External applications

[a] Extreme deformation characteristics of material required test method revision to 1000 p.s.i. load for 6 hours. [b] Above these temperatures physical properties drop rapidly.



1 *Because melamine mineral-filled plastic has superior arc resistance, and will not support an arc caused by surface contamination, it is used as insulation in the speed control device above*



2 *Counting wheels in business machines must spin rapidly, stop, and reverse their motion with a minimum of inertia. Plastic wheels (at top) with metal gear inserts, are light in weight*

In electrical applications, certain plastics have properties against which metals can offer no competition. Typical of this phase is the speed control device shown in Fig. 1. A melamine-formaldehyde plastic is used in this part not only for electrical insulation but also for superior arc resistance. Over long periods of time, carbon, oil, and dust can collect on the insulating parts. Such contamination serves as a conductor and can cause current leakage which may eventually lead to an arcing condition which normally would cause complete failure when using phenolic materials. The superior arc resistance of the melamine mineral-filled plastic prevents this condition by failing to support the arc when the surface contamination shorts.

Weight as a factor

Figure 2 shows an application where weight is the prime factor in using plastic material. The counting wheel shown is one of a great many used in a single accounting machine. The wheel is a cellulose type plastic injection-molded over a metal gear insert. The characters are paint-filled after molding. The wheel may whirl and reverse its direction as many as 80 times a minute. The operation of the gear requires the use of metallic hardness from the standpoint of wear. The plastic is required because of the amount of inertia to be overcome with a great many wheels operating so many times a minute. Low weight is necessary. The color of the plastic also avoids the necessity of an extra finishing operation which would be required for metal.

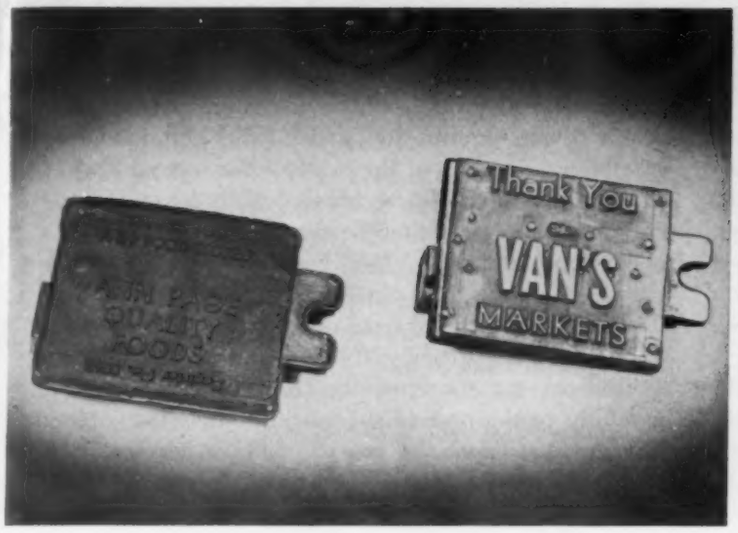
Also in Fig. 2, at the bottom, is shown a metal counter wheel. The small size and subsequent low weight in this case have permitted the use of aluminum for this application. The bearing surface and the wear at the point where the tang enters the hub necessitate the use of metal in this case. Aluminum is used and is anodized, dyed, and subsequently filled for character contrast.

An application for plastics which both reduces cost and increases wearing qualities is shown in Fig. 3. Here are two printing plates; one made by the conventional metal electrotype process, and the other by injection molding of a vinyl chloride plastic. The electrotype plate at the right requires 21 operations. It is then soldered to the metal plate which has been blanked, formed, and hole punched. The whole metal assembly is nickel-plated to protect it against the fatty acid, oil-base, non-drying type inks used in printing from cash register ink ribbons. The second plate is injection-molded into a laminated phenolic matrix which has been molded from the original type setup. Both the oil resistance and damping qualities of the semi-rigid vinyl chloride insure longer life and protection against breakage while fewer processing operations reduce the cost.

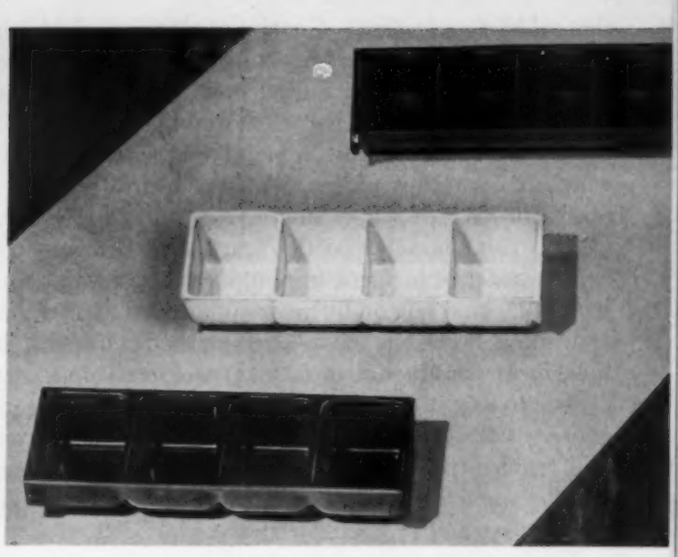
In Fig. 4 are shown three trays from which coin changing is done. All three trays have been used in the same application. The tray in the center, made of aluminum, is a sand casting requiring some subsequent machining, and an anodic treatment. The tray at the top is of fabricated steel and is coated with a baked alkyd-type finish. The other tray is plastic, requiring no finishing.

The relative weights of these trays are as follows: the aluminum weighs 1.5 lb., the steel 1.5 lb., and the plastic 1.2 lb., showing that it was necessary to use varying amounts of each material to acquire proper strength of the tray.

The ratios of costs can be shown as follows: the aluminum is highest at a figure of 13, being comprised of 6.5 in labor and 6.5 in material; the steel is second, at a total of 5.4, comprised of 4.4 in labor and 1.0 in material; and the plastic is lowest, at 2.8, comprised of 1.0 in labor and 1.8 in material.



3 *Plastic and metal printing plates compared. The metal plate at right requires many finishing operations; plastic plate at the left is injection molded from original type and has long life*



4 *Coin trays for cash registers. Top tray is of steel, center of aluminum, and bottom of plastic. Bottom tray is lighter, lower in cost, resistant to wear, and pleasing in appearance*

As far as abrasion from coins is concerned, the aluminum is, of course, quite wear resistant, but it discolors in contact with copper and silver. The steel is somewhat conducive to wear as far as its coating is concerned and is inferior in this respect to either the aluminum or the plastic. The loss of the coating also permits corrosion of the steel. Plastic, with color distributed throughout its mass, is quite wear resistant, sufficiently weather resistant, and very good in chemical resistance. Its lighter weight and pleasing appearance, coupled with its much lower cost, have made it a desirable product in an application of this sort.

However, there are similar applications where special sizes and shapes are required at relatively low-volume production. Fabricated steel trays and even wood trays are used in some such cases because high mold cost as well as setup time makes it undesirable to attempt to produce molded drawers for any production less than would be required for a standard product.

In Fig. 5 is shown an application for plastic materials which takes advantage of their low thermal conductivity. These units are two types of oil cups for motors used on accounting equipment. The one made of steel is a typical screw machine part. The other, made of a heat-resistant high-acetyl cellulose plastic, is an injection molded product. Transparency allows the amount of lubricant left in the cup to be seen.

The use of plastic in this application provides desirable insulation—because of low thermal conductivity—of the end of the cup from the heat of the motor. This insulating property permits the lubricant to remain at its original viscosity rather than becoming quite fluid as it does in the metal oil cup. More satisfactory lubrication is thus obtained. The steel part in this case costs almost exactly twice as much as the plastic part.

Another application where wear is an important factor in the use of plastic versus a coated steel is shown in Fig. 6. These parts are fronts for drawers on cash registers. An open drawer containing coins is usually closed by pressing it with the hand on the front section, which is a separate part attached to the drawer. Metal drawer fronts which are coated with organic finishes have a tendency to wear, with a resulting loss in coating in localized spots and possible attendant corrosion. Plastic parts in this application wear extremely well not only because the color is distributed throughout the part but also because the plastic has some flexibility.

Cost factor

A comparison of costs is as follows: in an unfinished condition the cost of the steel part would be 2.7, composed of 1.0 in labor and 1.7 in material. However, this cost is materially increased by the addition of several coats of a high-grade organic finish, resulting in a total cost of 12.7, composed of 11.0 in labor and 1.7 in material, which compares to the plastic cost total of 6.8, composed of 3.3 in labor and 3.5 in material. The steel part weighs 0.8 lb. and the plastic part 0.3 pound. Weight is also an important factor in this case because of inertia to be overcome in operation.

In Fig. 7 are shown several types of key buttons used on business machines. At the left is an injection-molded button, the character being formed in the molding operation and later filled with a paint filler and barrel-rolled for cleaning. Such keys are used in applications where dirt and wear are not prime factors in operations; dirt, of course, will fill the recessed character, which also is unprotected from wear.

The second key shown is of laminated structure, consisting of a transparent plastic cap, a paper disk with printed matter and adhesive on it, and a preform button, all three of which are laminated in a compres-

sion-molded operation. Control of all the variables in material is of extreme importance in this structure. Such a key is used where wear and dirt are problems, the cap protecting the character from both factors.

As a matter of interest, a metal key is also shown in which is inserted a paper disk for the printing and a plastic or glass disk over the top for protection against wear. The character on the fourth key is formed by heat transfer of pigment from a plastic tip onto the injection-molded button by means of a metal die. When type metal is used as the die, this method is found to be ideal for the production of such keys for low-volume use. It is obvious that this method is much faster and cheaper than any low production method which would still require the manufacture of metal dies. This key has the same limitations as the first one shown in that its surface is not protected from wear and dirt.

The last key shown is one which is of considerable interest at present and embodies the double-shot or double-injection principle. In this key is shown the character which is formed in the first injection operation; the exterior of the button is injected around it in a second mold. Keys produced by this method offer considerable protection from both wear and dirt accumulation, inasmuch as the character can be made reasonably thick and is flush with the surface of the button.

Cost comparisons of the keys are as follows: the metal key is the highest at 10.2; the laminated key second at 6.6; the filled key third at 4.6; the heat transfer key fourth at 2.6; and the double injection key lowest in cost at 2.12.

Machine housings

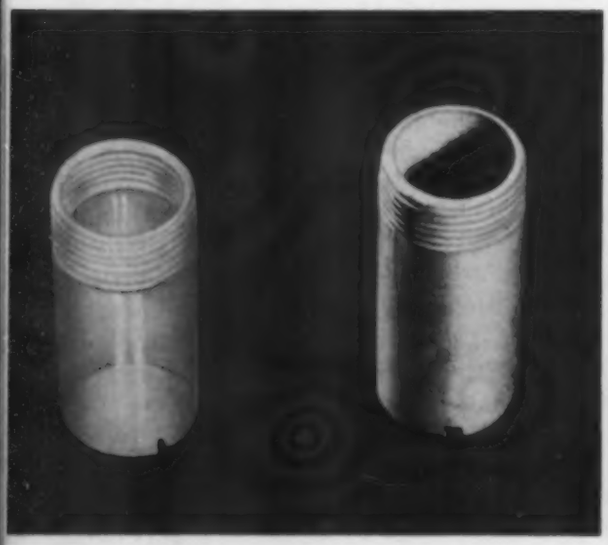
Figure 8 is a metal cash register housing, which is used not only as a covering for the machine but as a structural part as well. The particular machine to which this cabinet applies is used in food stores and is subjected to considerable shock and abrasion by customers passing the machine, as well as by the action of the operator of the mechanism. Several parts of the machine have to be accessible periodically during the day and this requires doors with locks permitting access to certain parts of the machine for replacement of paper rolls, etc., without access to other parts of the equipment. Delicate mechanism in the top of the machine is protected by a steel housing upon which merchandise is sometimes piled and occasionally dropped. The machine is moved from one portion of the store to another and quite frequently from one store to another. It is important, consequently, that the cabinet be tied carefully to the base of the machine, that the cabinet have great strength and shock resistance, and that it be dimensionally stable.

A plastic housing for such a machine would have to be applied over a metal skeleton which would have all the properties mentioned. This housing would necessarily be removed whenever the machine was handled. Flexible mountings would be necessary to compensate for differences in thermal expansion of metal and plastic. Resistance to shock would be important and most certainly would necessitate the use of high impact materials. All of these factors make a plastic housing for this particular application questionable.

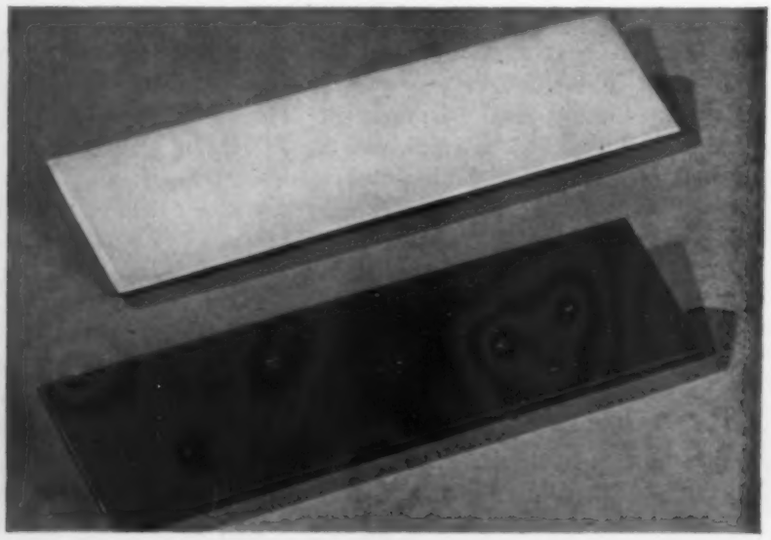
It is not intended to imply that plastic housings are not entirely successful on other pieces of office equipment. Those places where equipment is reasonably light and the internal mechanism is entirely divorced from the housing itself, so that the housing may be removed with ease, are excellent possibilities for plastics. This has been evidenced in the adding machine field in particular.

It must be remembered, however, that plastics will necessarily in the future have to compete in these applications with such light metals as magnesium, whose

5 *Low thermal conductivity of a heat-resistant cellulosic makes it adaptable to the oil cup (left) shown with metal cup which it replaces. Initial cost is also lower*



6 *Fronts for drawers on cash registers must withstand localized wear caused by user's hands. Plastic parts in this application wear extremely well and have the added advantage of a certain amount of flexibility*



excellent deep-drawing properties make it a relatively low-cost material for housing applications.

Attractive to engineers

At the present time it must be admitted that the organic plastic materials now available are limited in their engineering applications when compared to metal. At the same time it must be conceded that they have certain characteristics which make them attractive to both designer and engineer. Such characteristics are: low density, dielectric properties, ease of fabrication, low thermal conductivity, high damping capacity, available transparency, and low unit cost for mass production.

On the other hand, available plastics are second to the metals in strength, thermal expansion, modulus of elasticity, cold flow, heat resistance, water absorption, and hardness. They cannot be treated to affect localized changes in properties which are so important to wear of moving parts.

But there is no doubt that the plastics industry will find far greater outlets for its products in applications where plastic properties excel and where engineering knowledge has not yet cleared the way for proper application of these materials. When this is accomplished, the proportion of plastics to metals should be much higher than it is today.

The actual price of plastics is a complicated subject; it cannot be regarded as anything like as stable as that of metals. The processes by which metals are won and worked are old and stabilized as are also the approximate quantities produced, but plastics are continually increasing in production and, relative to other materials, are tending to fall in price.

It is necessary to remember that there are several important general considerations in the designing of applications for any plastic material which may replace metals, which considerations are not usually found in tabular data. The following must be kept in mind:

1. The effect and nature of the application of stress.
2. The amount of permanent dimensional change in time.
3. The required service temperature and humidity range.
4. The previous history of the material.
5. The effects of change in temperature on physical properties.

To be more specific, it may be said that the engineer must know the function of the part as well as all of the operating and service conditions. No matter how obvious these conditions may appear it is also obvious that they cannot be correctly and profitably applied unless the engineer has sufficient familiarity with the extensive practical tabulation of chemical and physical characteristics of plastics to be able to evaluate them properly in terms of his problem.

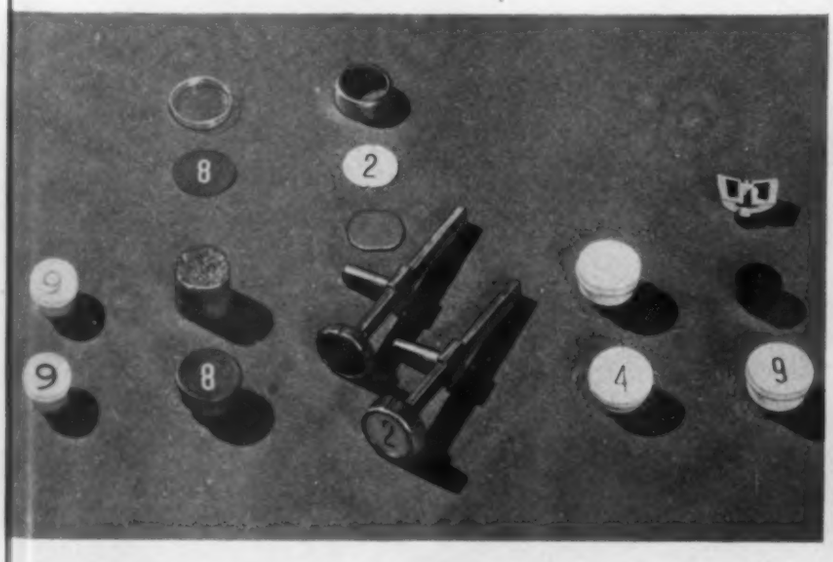
In this respect it is quite important that active assistance be given those groups of engineers who are attempting to develop end use requirements for materials according to specific industries. The development of simulated service tests and ultimate requirements will eventually lead to general education of the engineer in proper use of plastics as he is already educated in metals.

In its proper application there is no substitute for the right material, be it metal or plastic. By a right material is meant one which is carefully selected with a particular application in mind, a material that is carefully worked into a design which meets the needs of the user while making the best possible use of the material.

Acknowledgment

The author wishes to acknowledge the assistance in securing data given him by Mr. J. L. Russell of the Plastics Laboratory and Mr. J. W. Price of the Metallurgical Laboratory of the National Cash Register Co.

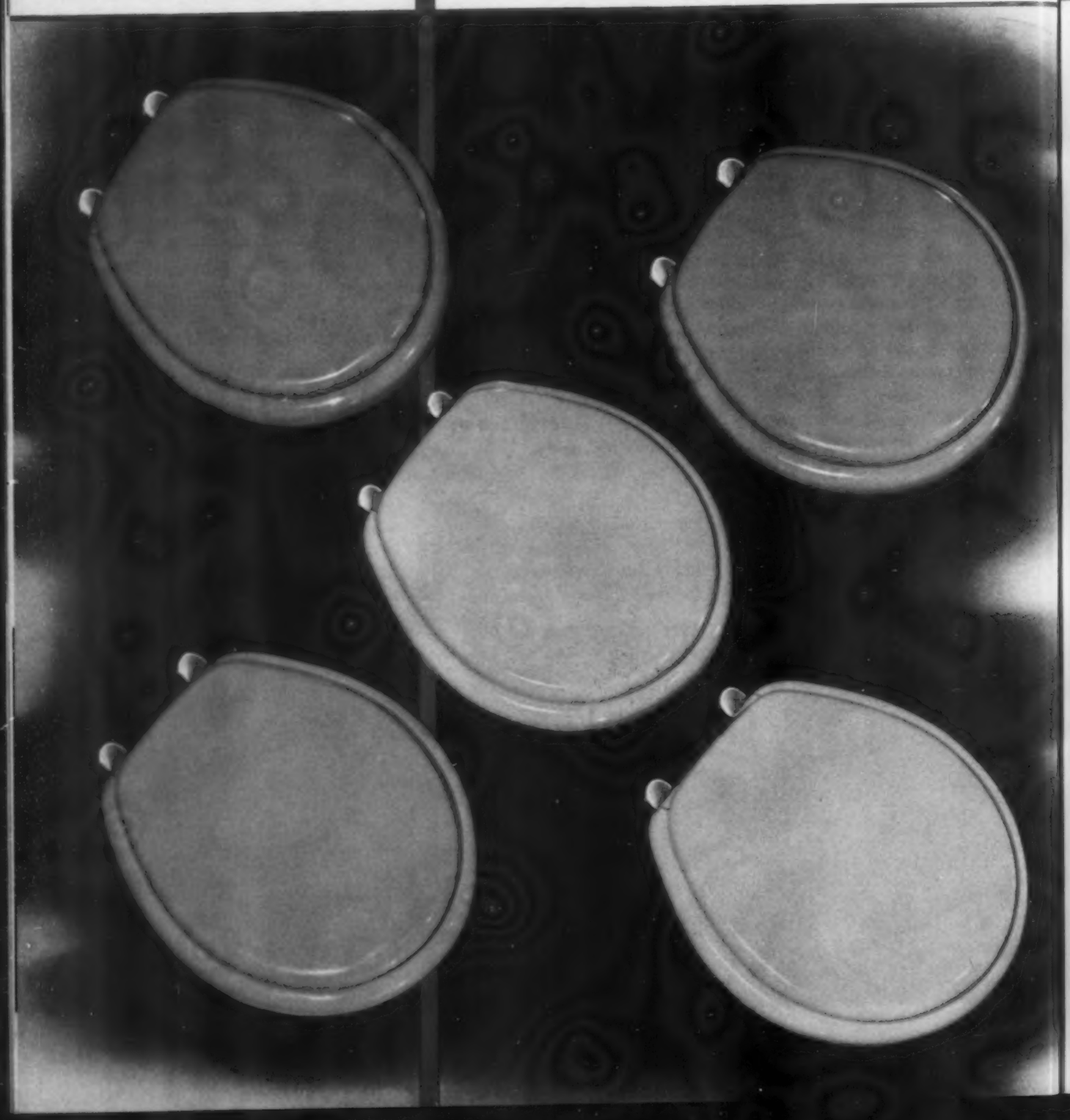
7 *Several types of key buttons for business machines. These include injection molded, paper capped, and double-shot types, all of which are discussed in the text, together with advantages and disadvantages*



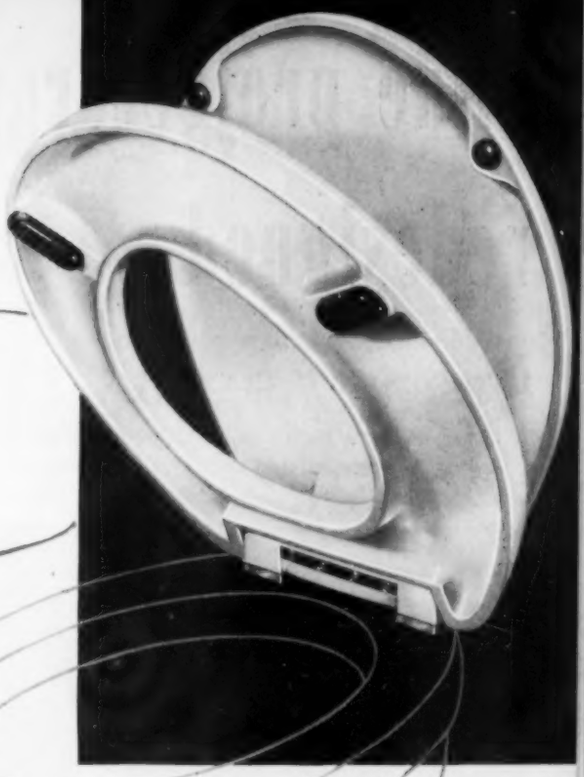
8 *A metal cash register housing, which is also a structural part of the machine. In the text the author discusses the possibilities of plastics in such applications*

Why
a Plaskon Molding Material
was selected
for this unusual application

THE LANFARE COMFORT MASTER TOILET SEAT O



AT OF PLASKON MOLDED COLOR



Offers Unusual Features of Beauty and Service

Solid Plaskon Molded Color *through and through* . . . that means permanence of finish, freedom from chipping or cracking, sparkling cleanliness, and resistance to water, weak acids, soaps and other solvents.

The Lanfare Toilet Seat represents a radical step forward in the manufacture of this type of houseware. The introduction of a wide range of beautiful, *permanent* colors satisfies particular decorating requirements. The moldability of Plaskon permitted structural designs that give the seat and cover great strength, which prevents splitting. The feature of sanitation has profitable sales appeal.

This is another example of product development aided by the *thermosetting* properties of Plaskon Molding Compounds, which include excellent dimensional stability, low water absorption, non-softening action from heat, and its ability to withstand common cleansing detergents and weak acids.

Plaskon Molding Compounds can be transformed into almost any distinctive, practical design or size of product. A wide range of clean, brilliant, permanent colors is available.

The hard, non-porous surface of molded Plaskon will not tarnish, check or corrode. It is impervious to the effects of alcohol, acetone, oils, waxes or greases.

Write for free illustrated book showing many uses of Plaskon* urea-formaldehyde and melamine-formaldehyde molding materials in manufacturing and merchandising.

*Reg. U. S. Pat. Off.

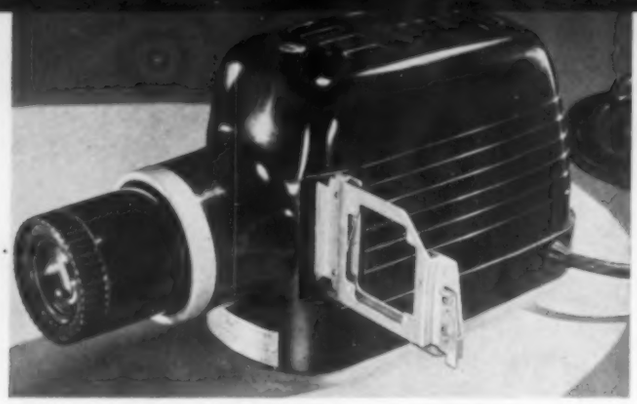
PLASKON DIVISION
LIBBEY•OWENS•FORD GLASS COMPANY
2121 SYLVAN AVENUE • TOLEDO 6, OHIO
IN CANADA: Canadian Industries, Ltd., Montreal, P. Q.

This Toilet Seat is made from Plaskon Molding Compounds by Lanfare Molded Products, Toledo, Ohio

PLASKON
TRADE MARK REGISTERED
MOLDED COLOR

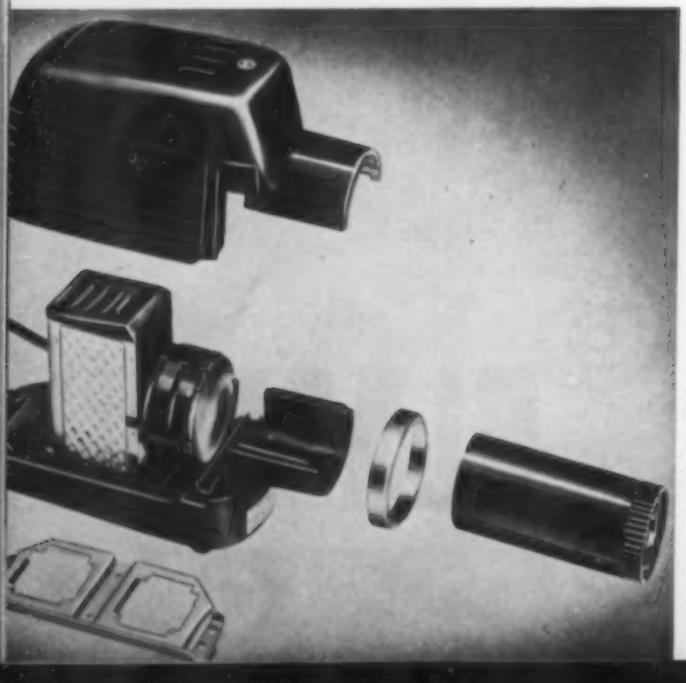
Slide projector redesigned

by THEODORE G. CLEMENT*



Steps on redesigned phenolic body eliminate buffing of flow marks and add to eye appeal

By comparing unassembled parts of old style projector, above, with the new projector, below, it can be seen that the entire unit was redesigned with the exception of the lens mount



THOUSANDS of amateur photographers, businesses, and industries have made use of the Kodaslide Projector, Model 1, a low-priced, 2 by 2-in. slide projector which has just been made more efficient through restyling.

The first move in producing the new projector —Model 1A—was to style the black phenolic body along more modern lines, to increase eye appeal by the use of generous radii and subtle sweeps all around, and to eliminate the "oil can" effect of flat surfaces. The sides were given a series of 0.012-in. steps to eliminate the need for buffing out flow marks. This provided one means of reducing costs, and also provided a means for decorating and emphasizing the horizontal dimensions of the machine.

To eliminate additional finishing and assembly operations, the top half of the projector was molded with a lip on the rear to slip under a molded recess on the base; the two being held tightly by the same metal collar at the front.

Housing temperature reduced

The toughest engineering problem at first seemed to be in the dissipation of heat, because while the change was being made it was decided to increase the projector's illumination from 100 to 150 watts. This presented a serious situation because the outside of the old machine had been known to reach a high temperature even with the 100-watt lamp. However, by providing only a single piece rigidized lamp shield and by spraying the inside of the plastic body of the new model with metallic aluminum, the engineers were able to reduce the outside body temperature by 37° F. while still increasing the lamp wattage 50 watts. This reduction was also aided by the redesign of the top member to permit better air circulation.

Slide carrier guides have also been added to the new model so that it is no longer necessary to push each slide in individually to eject the previous slide. The all-metal slide carrier used on more expensive projectors became a part of this equipment as a result. Another addition is the red anodized aluminum "Kodak" insignia button in a molded recess atop the machine.

* Styling Div., Eastman Kodak Co., Rochester 4, N. Y

Steam at the molding press

THE popular trend toward generating high pressure steam right at the press by simply throwing a switch has resulted in the successful development of an electric steam generator despite the vicissitudes common to many new enterprises. The work on this boiler was well advanced by a Boston company several years ago, but differences of opinion caused Stanley Livingstone, who had been associated with the original enterprise, to continue independently, with the backing of some of the men who had been prominent in that company. Further development followed and now Livingstone Engineering Co., Boston, Mass., is in production on an electric steam boiler which has proved dependable under operating conditions.

The work included an extension of the pressure range so that there is now a model available for a maximum working pressure of 500 p.s.i.

After principles had been worked out, Arthur D. Little, Inc., of Cambridge, Mass., was retained to go over the boiler in all details and to engineer its adaptation to industrial use. The method of employing electricity to generate steam is to use the water between solid rod electrodes as the resistance element. This eliminates any possible low water hazard, because with no water to make contact between the electrodes, no current can pass and no steam can be generated. Under this principle the current consumption depends upon the electrode area immersed.

Self-contained electrically powered steam generator in the Northern Industrial Chemical Co. mold room. The test set-up is supplying steam for heating of a semi-automatic compression mold

Pressure regulates immersion

It was found that the most precise pressure control could be obtained by making the pressure itself regulate the extent of immersion so that the resistance would fluctuate in exact proportion to the changes in heat requirements. This is accomplished by having two tanks connected to each other at the top and bottom but with a pressure regulator in the top line which also feeds steam through the load. One tank houses the electrodes; the other is a surge tank. The pressure regulator remains open until the pressure it is set for is reached, at which time it closes the top line with a throttling action.

Thus, in operation, steam is generated in the electrode chamber, flows to the load and through the regulating valve to the surge tank. Consequently, both tanks have water in the lower portions and steam above and pressures throughout the system are equal. When the operating pressure has been reached, the valve in the top line closes, throttling the flow of steam to the surge tank, which causes the pressure in that chamber to fall below the pressure in the generating chamber. This condition is corrected by the steam in the generating chamber forcing the water from that chamber into the surge chamber, an operation which progressively uncovers the electrodes. The current input drops in proportion to the electrode exposure so that the rate of steam generation is controlled in accordance with the load requirements while constant pressure is maintained through the balancing action of the two tanks and the regulator.

Central boiler limitations overcome

Livingstone Engineering's most encouraging adviser has been Mr. Hans Wanders of the Northern Industrial Chemical Co., South Boston. He has maintained steadily that there is a tendency toward temperatures for plastics molding higher than most plants can reach with existing steam facilities and that with the return to anything like normal conditions the factor of the individually powered press will be of great value in freeing molders of the fixed cost and operating limitations of a central boiler which must be kept in operation regardless of the number of presses in use each day.

1. The industrial molding material, MELMAC 1502, makes it possible for the famous RCA television camera tube—RCA-2P23—to provide better performance.

2. MELMAC 1502 used in the projection, picture-reproduction tube — RCA-5TP4 — as shown above, helps to provide the superior performance for which RCA tubes are well known.

Will MELMAC* Plastic 1502 Make Your Product Right?

On the opposite page

we publish again the initial advertisement in our current series designed to promote correct application, proper design, and selective purchasing of plastic products.

On this page, we offer an example of "the right plastic properly designed and applied."

* * * * *

MELMAC Plastic 1502 was thoroughly researched and tested by the Radio Corporation of America, to make sure that it would build into high voltage television tubes even better electrical characteristics and performance qualities. As a result MELMAC Plastic 1502 was established as the right *plastic* for this specific application.

If dimensional stability, high arc resistance, and ready moldability either by transfer or compression methods are of practical value to you, consult us about MELMAC Plastic 1502.

AMERICAN CYANAMID COMPANY,
Plastics Division,
32 Rockefeller Plaza, New York 20, N. Y.

*Reg. U. S. Pat. Off.

SOME TECHNICAL FACTS ABOUT MELMAC* PLASTIC 1502

1. Shrinkage

Low shrinkage is a characteristic of this new plastic material.
Mold—.0066 (.006-.007) in./in.
After 8 hrs. at 220° F—.0002 (0-.001) in./in.
After 48 hrs. at 220° F—.0011 (.0005-.002)
Weight per Cubic Inch—23.4 gms.

2. Electrical Properties

Tests conducted according to ASTM Methods (0.125 in. Specimen).
Arc Resistance—(80-128) secs.
Track Resistance—Good
Uniformity of Arc Resistance—Excellent

3. Physical Properties

Tests conducted according to ASTM Methods.
Specific Gravity—1.43 gms./cc.
Water Absorption 24 hrs. at 25° C; %—0.28 (0.27-0.29).
Izod Impact—.40 (.38-.41) ft. lbs.
Flexural Strength—9500 (9000-10,000) lbs./sq. in.
Deflection—.050 (.048-.053) inches

Here's what this has done for you

This advertisement originally appeared a few months ago as the first in a new series. *Since then here's what has happened:*

Leading button manufacturers have pledged renewed effort to the end that only the *right* plastics will be used for buttons.

Department and chain store buyers are more alert than ever to the necessity for care and discrimination in purchasing plastic items for resale to the public.

Members of the dry cleaning industry, individually and through their national and local associations, have asked for more and continuing information on the types of plastic buttons that are not damaged by laundering and dry cleaning.

* * * * *

Such results, typical of those being achieved by subsequent advertisements in this Cyanamid Plastics series, are increasing the value and efficiency of plastic products for all concerned . . . maker, seller, and user.

She ruined her date on the ironing board

ONE OF THESE WOULD HAVE SAVED IT

DATES AND DRESSES need not be spoiled by buttons that don't survive laundering, ironing, or dry cleaning.

Many millions of lovely plastic buttons stay whole and beautiful even under repeated attacks by washing machines, hot irons and rugged dry cleaning routines. Such buttons are made of the right type of plastic material . . . *thermosetting* plastics, like MELMAC® or BEETLE® compounds, which will not catch fire; will never soften under a hot iron; will not be ruined by cleaning fluids; and will not lose or change color, whether brilliant, pastel, ivory or white.

Remember this . . . *no one plastic serves all plastic needs* . . . no more than any one metal meets all metal requirements. So, when buying, selling or making plastic products or parts request information that will assure you they are soundly designed in the plastic best suited for the jobs they must do.

BE SURE YOU GET THE DIFFERENCE

Two plastic buttons may look exactly alike. The difference is that one is made of the right plastic properly designed and applied. To make sure of long service, look for informative labelling or ask for the facts about the plastic products you buy.

QUESTIONS PLEASE! Our technical staff will be glad to help you solve problems in plastic application and design. And if our materials do not fill the bill exactly, we will cheerfully direct you to the right sources. American Cyanamid Company, Plastics Division, 32 Rockefeller Plaza, New York 20, N. Y.

BEETLE® plastics—urea-formaldehyde thermosetting molding compounds. MELMAC® plastics—melamine-formaldehyde thermosetting molding compounds, industrial and laminating resins. URAC® resins—urea-formaldehyde thermosetting industrial resins and adhesives. MELURAC® resins—melamine-urea-formaldehyde thermosetting resin adhesives and laminating resins. LAMINAC® resins—thermosetting polyester resins.

®Reg. U. S. Pat. Off.

Cyanamid
Plastics

DIVISION OF AMERICAN CYANAMID COMPANY

The new Remington KMC Typewriter has black phenolic platen knobs . . . with metal inserts, transfer molded for Remington Rand by Plastic Manufacturers, Incorporated.

PM
REG. U.S. PAT. OFF

PLASTIC MANUFACTURERS
INCORPORATED

STAMFORD CONNECTICUT

INJECTION • TRANSFER & COMPRESSION MOLDING • COMPLETE ASSEMBLY

Case hardening of phenolic casting resins

by GERALD A. STERBUTZEL and JAMES T. GREY*

AS PART of a program on the evaluation of cast plastics and castings processes[1] conducted under contract with the War Production Board by the former Curtiss-Wright Corp., Airplane Division Research Laboratory (now known as the Cornell Aeronautical Laboratory), experiments were carried out to determine the advisability of heat treating plastic castings for production tooling uses. In this phase of the program the value of quenching, annealing, and case hardening was studied. Although significant trends were observed in the quenching and annealing parts of the program, those of the case hardening phase appear to be of such importance that this paper is confined solely to the case hardening part of the report on heat treatments.[2]

Case hardening was considered originally as a possible method of recovering the properties of the skin-like surface on a casting. In most cases this skin-like surface is lost during the finishing operations, which the rough casting undergoes before it can be used in production. The skin of the unfinished casting is usually a harder, stronger, and, hence, a more desirable material than the core as a surface for production tools. These characteristics have not only been surpassed by case hardening, but have been produced to a greater depth. It has even been found possible, in the case of an acid catalyzed resin, to save the skin and, by the case hardening treatment, expand the casting to the predesigned usable size by recovering the shrinkage which occurred during the curing cycle.

Experimental procedures

For these experiments three types of baths were used—oil, metal, and air. Socony-Vacuum heat transfer oil was used for the oil bath. Cerromatrix was used for the metal bath. A forced draft oven capable of temperatures up to 500°F. was used for air bath experiments. Initially, the case hardening experiments consisted of immersing 2-in. cubes into their respective baths. After these were immersed for the proper time and temperature, they were removed, cut in half, and tested for hardness on both the outer surface and the center of the newly cut plane. These data were then recorded and calculations were made to obtain a ratio of the two hardnesses. They were recorded as surface hardness divided by core hardness. Experiments were finally made on regular 5 by 0.5 by 0.5-in. test specimens. By treating the test specimens in the same manner as were the 2-in. cubes, additional data such as shrinkage, flexural and compressive strengths, and moduli of elasticity both in flexure and compression were observed. Testing technique was exactly the same as used for the experimental work previously described.[1]

Because the time allowance for this research was limited, only two phenolic casting resins were investigated. Catavar #101 was chosen as representative of the non-catalyzed casting resins and Durez #7421A was chosen to represent the catalyzed type.

Evaluation of the casting resins

Durez #7421A—When treated in oil, the Rockwell hardness of the cubes fluctuated considerably, so that it was difficult to find a definite trend in the ratio of the hardness of the surface to that of the core. In a number of cases, particularly as a result of short time treatment, the core hardnesses were higher than the surface hardnesses, indicating that the surface of the resin was softened by the initial shock. The fact that the ratios were erratic was due primarily to the original irregular hardness of the cores. Nevertheless, after treatment a slight trend could be observed toward higher hardness values for the surface. The maximum hardness value was observed on the surface of a cube treated for 30

* Cornell Aeronautical Laboratory, Buffalo, N. Y.

[1] P. E. Erbe and J. T. Grey, MODERN PLASTICS 24, 153 (Nov. 1946).

[2] Heat treatments of thermosetting resins; PB 27101; mf. $2.00, ph. $5.00. The PB reports are available from the Office of Technical Services, Department of Commerce, Washington 25, D. C.

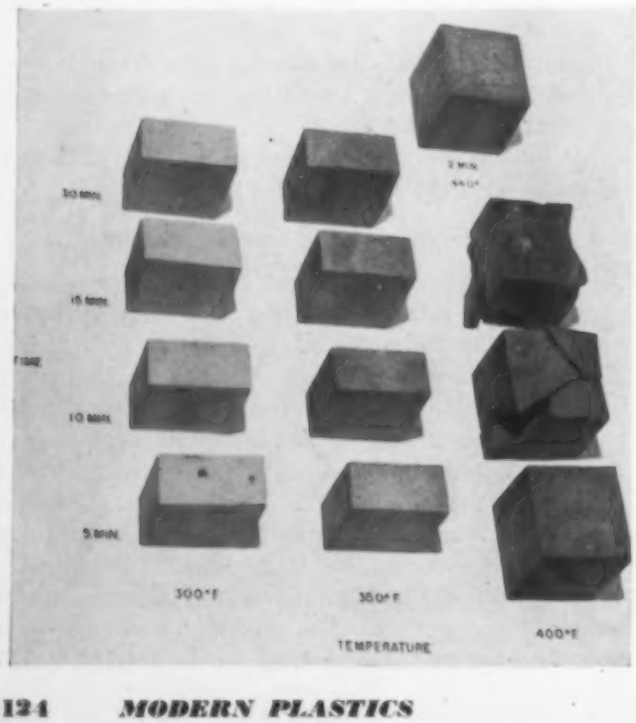
Table I.—Case Hardening of Durez #7421A Test Specimens in Oil

Temp.	*Time*[a]	*Shrinkage*[b]	*Rockwell hardness, M scale*	*Ultimate strength properties* — *Flexure*	E_f	*Compression*	E_c
°F.		in./in.		p.s.i.	10^5 p.s.i.	p.s.i.	10^5 p.s.i.
Standard		0.0000	66	7,900	4.10	13,000	4.55
150	1 d	0.0010	75	9,700	3.76	13,300	4.00
	2 d	0.0014	75	8,200	3.61	13,200	4.16
	6 d	0.0021	74	10,300	3.88	15,000	4.54
200	6 h	0.0005	76	8,700	3.54	13,800	4.19
	12 h	0.0011	80	9,000	3.72	13,500	3.74
	1 d	0.0016	79	9,300	3.70	14,300	3.77
	2 d	0.0026	81	8,300	3.87	14,300	3.56
	4 d	0.0039	80	8,600	3.77	15,500	4.11
250	3 h	−0.0022	80	9,200	3.34	13,500	3.77
	6 h	−0.0024	79	7,800	3.61	13,000	3.79
	12 h	−0.0021	76	7,700	3.52	12,100	3.53
	1 d	−0.0007	75	7,200	3.63	16,400	3.97
	2 d	0.0014	80	7,400	3.58	17,800	4.24
300	1/4 h	−0.0032	83	9,700	3.27	13,300	3.30
	1/2 h	−0.0036	88	9,100	3.30	15,000	3.58
	3/4 h	−0.0038	85	8,400	3.14	13,400	3.04
	1 h	−0.0032	84	9,700	3.23	13,300	3.19
	1 1/2 h	−0.0023	84	8,900	3.32	14,600	3.10

[a] Units: d = days; h = hours.
[b] Minus shrinkage indicates an expansion.

min. at 300° F. The treatment at 400° F. is not advisable because of the tendency of the resin to crack or explode on cooling, when treated for more than 2 minutes. At 400° F., when treated for 5 min., the cube cracked badly; when treated for 10 min., the cube broke into several large pieces; and when treated for 30 min., the cube disintegrated explosively (Fig. 1). Except for isolated instances, the cracks and explosions resulted after the cubes were allowed to remain in air at room temperature for only 10–30 seconds.

1—Results of treating 2-in. cubes of phenolic casting resin in oil under varying conditions



Generally, the results of the case hardening experiments in air were slightly more constant than those in oil. The initial heat treatment softened the surface of the cube as it did in the case of oil. This ruled out the possibility that the surfaces of the cubes were being attacked by the hot oil and, consequently, were given lower hardness values. Surface to core hardness ratios as high as 1.14 were obtained by heating for 13 min. at 400° F. Usually less difficulty was encountered with cracking after the material was removed from the air bath than was encountered after it was removed from the oil bath. However, a cube heated for 30 min. at 490° F. exploded violently after remaining in air at room temperature for 5 minutes.

Durez was also heat treated in Cerromatrix alloy. The results were similar to those previously observed. Because of the increased difficulty in handling liquid metal, the experiments were discontinued.

A number of standard test specimens made from the Durez resin were treated in exactly the same manner as were the 2-in. cubes. The results of the tests are shown in Table I and Fig. 2, p. 202. It can be seen the test specimens expanded gradually to a maximum and then began to shrink. The degree of shrinkage was greatly affected by the temperature; increased temperature gave the more rapid shrinkage. These characteristics were noted using temperatures of 250 and 300° F. Below these temperatures (at 150 and 200° F.) the expanding trend was not noticed, due possibly to the fact

that time intervals of less than 6 hr. were not used.

Increases were obtained in Rockwell hardness values, as previously noted in the experiments with the 2-in. cubes. Flexural strength was increased during the first case hardening treatments, appeared to reach a maximum, and finally decreased. The readings, however, did not form a smooth curve. Increases of more than 25% were obtained. The modulus of elasticity in flexure was lowered for all runs; appreciably for runs at 300° F. The compressive strength was also raised by heat treatment but again the values were somewhat variable. A definite trend toward higher compressive strengths with increased treatment time can be observed in Table I on the opposite page. The modulus of elasticity in compression was lowered by the initial treatment at 250 and 300° F.

The expansion of heat-treated Durez can be extremely significant for casting applications, because it opens up the possibility of recovering some, if not all, of the shrinkage encountered during the curing cycle. With increased case hardening temperature, the maximum expansion increased. The use of this expansion is, of course, limited to the danger point at which cracking of the castings begins. It is probable that this point can be approached more closely than the maximum value listed at 300° F. At 300° F. after 45 min., 0.0038 in./in. had been recovered from an average casting shrinkage of 0.0048 in./inch. If treated for 30 min. at 300° F., 75% of the shrinkage had been recovered and an increase of 15% in both the flexural and compressive strengths had been achieved. The situation is, therefore, favorable from all points of view. With further study, the time required to reach the zero shrinkage point for various size castings could be determined and the necessity of pouring oversize castings might be eliminated.

Catavar #101—The results of the treatment of Catavar #101 cubes in oil are shown in Fig. 3, p. 202; the ratio of surface hardness to core hard- (*Please turn to page 200*)

Table II.—Case Hardening of Catavar #101 Test Specimens in Oil

Temp.	*Time*[a]	*Shrinkage*	*Rockwell hardness, M scale*	*Ultimate strength properties*			
				Flexure	E_f	*Compression*	E_c
°F.		*in./in.*		*p.s.i.*	*10^5 p.s.i.*	*p.s.i.*	*10^5 p.s.i.*
Standard		.....	91	13,500	4.55	16,400	4.95
200	3 h	0.0008	74	16,200	5.11	15,600	4.52
	6 h	0.0025	77	15,300	5.25	18,300	5.25
	12 h	0.0023	78	18,300	4.85	17,300	5.82
	1 d	0.0040	87	20,200	5.33	18,300	4.28
	2 d	0.0058	97	19,900	5.38	21,700	3.84
	4 d	0.0080	102	19,200	5.52	23,900	4.40
	6 d	0.0103	106	21,000	5.60	25,200	5.17
250	1 h	0.0011	78	19,600	5.00	15,800	5.75
	3 h	0.0037	104	20,000	5.57	23,900	4.47
	6 h	0.0059	102	20,300	5.20	23,800	5.80
	12 h	0.0071	101	20,900	5.36	22,100	4.72
	1 d	0.0082	109	21,300	5.67	23,900	4.59
	2 d	0.0118	114	20,900	5.54	28,600	4.58
	4 d	0.0164	114	19,100	5.60	26,200	4.52
275	1/2 h	.....	92	18,200	4.86	16,300	5.42
300	1/4 h	.....	92	17,200	4.94	16,500	5.17
	1/2 h	.....	105	18,700	5.03	17,350	3.76
	3/4 h	.....	102	19,300	4.99	21,100	5.39
	1 h	.....	112	19,500	5.13	23,200	4.94
	1 1/2 h	.....	111	19,200	5.21	22,800	5.42
	2 h	0.0043	105	20,700	5.32	24,300	4.58
	4 h	0.0064	116	20,100	5.31	24,400	4.71
	6 h	0.0068	117	17,400	5.06	26,400	4.79
	12 h	0.0097	119	18,400	5.06	27,700	4.33
325	1/4 h	0.0015	99	19,900	5.42	22,900	4.71
	1/2 h	0.0016	103	19,300	5.60	24,600	4.37
	3/4 h	0.0019	105	19,800	5.29	26,100	4.07
	1 h	0.0024	106	22,200	5.30	26,000	4.11
	1 1/2 h	0.0021	107	[b]	5.30	26,300	4.45
350	1/12 h	0.0000	95	19,500	4.80	17,400	4.23
	1/6 h[c]	0.0038	.....	500	....	4,200	....

[a] Units: d = days; h = hours.
[b] Flexural strength varied from 500 to 17,000 p.s.i.
[c] Test specimens began to craze after 8 min. of treatment.

Plastics in German aircraft tooling

by JAMES T. GREY*

EARLY IN 1945, the tooling panel of the aircraft war production council, East Coast, Inc., was invited by the joint chiefs of staff to send investigators to Europe to investigate German aircraft production methods. The objectives of this mission were to examine German production tooling and to seek out any materials, processes, or special techniques which could be used to expedite our own aircraft production. As one of the investigators, the author's specific interest was in the application of plastics to aircraft tooling. This interest was pursued throughout the British, French, and American occupied zones. Not all the aircraft manufacturers' main plants or dispersals were investigated, but a sufficient number were investigated to produce a representative report. Further, the leading plastics manufacturers were visited and their technicians queried on the use of plastics in aircraft tooling.

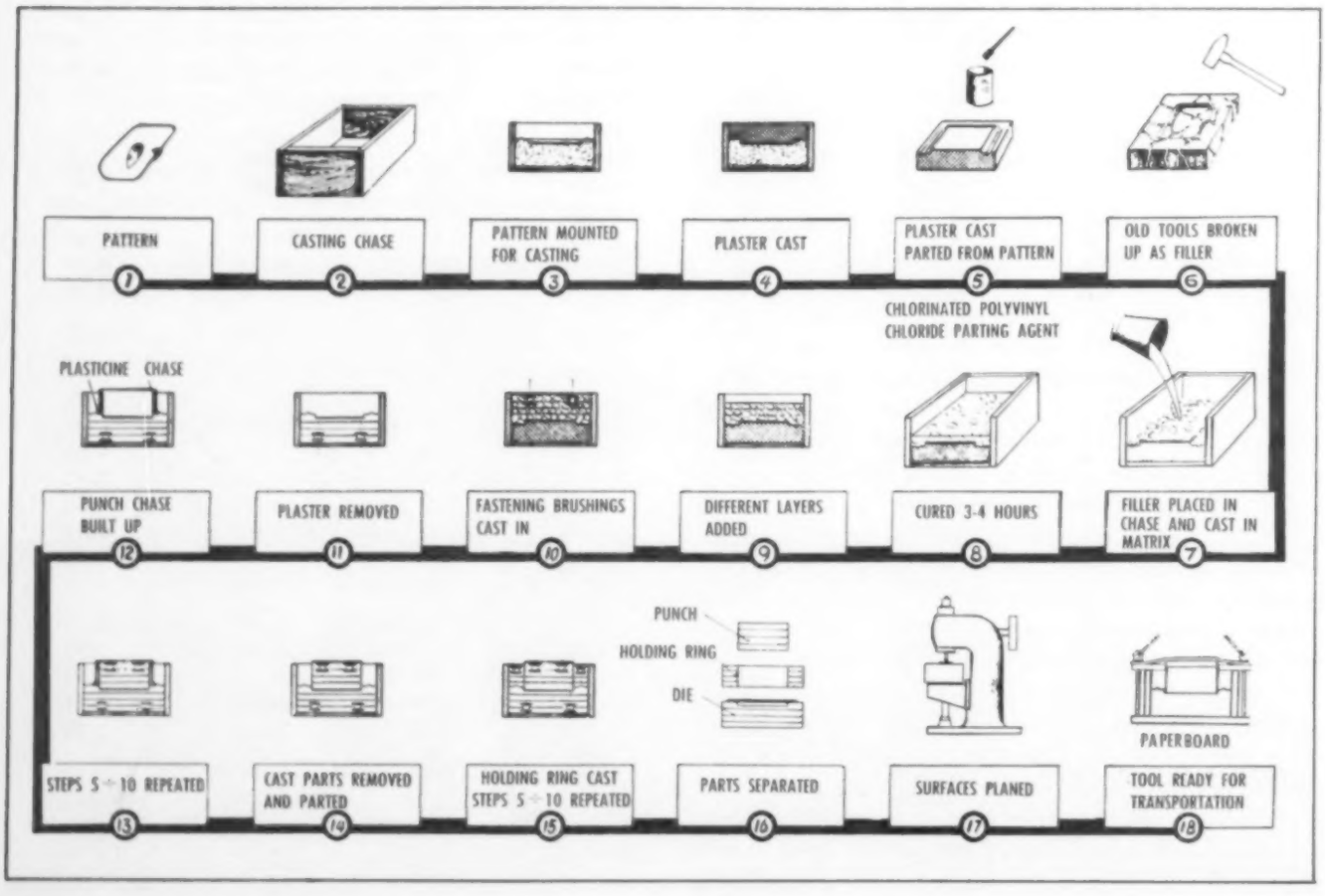
* Head of chemistry section, Cornell Aeronautical Laboratory.

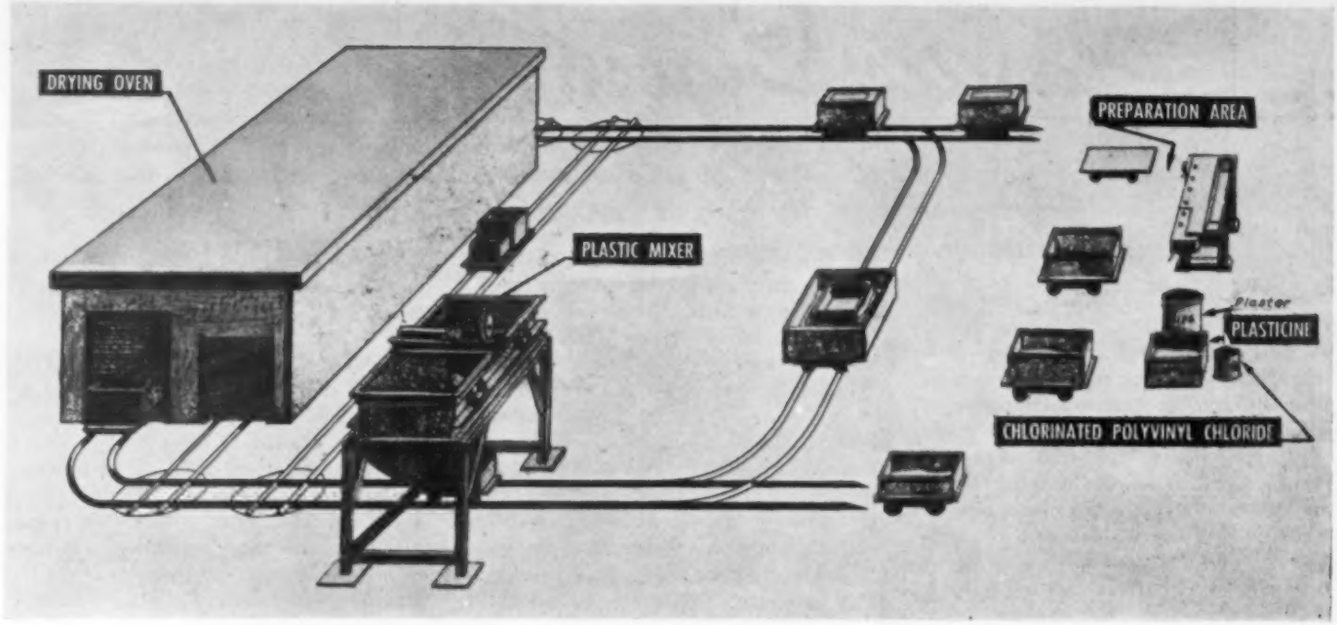
At the close of the investigation, it was concluded that the German aircraft industry had made very little use of plastics in production tooling, with the exception of certain grades of compressed resin-impregnated veneer (Pressholz), and that even their experimental efforts were insignificant. This is surprising in view of the known concentration of effort that the country as a whole was placing on "Ersatz" materials. The primary underlying reason for their apparent lack of attention in this field was undoubtedly the extreme shortage in the supply of plastics, particularly the castable phenol-formaldehyde resins. However, it was also found that prejudice and inertia retarded the application of plastics to tooling.

Castable thermosetting compositions

Of all the aircraft manufacturers, only the Junkers Aircraft and Motor Works[1] had experimented with the

1—*Steps in the process of casting phenolic tools from the pattern to the finished piece*





2—Plans for a central tool casting shop called for this casting area set-up

cast phenolic type plastics. They had tried casting forming-dies from phenolic resins manufactured by Dynamit A.G. (P-600),[2] Chemische Werke Albert ("AS" Leim and 319-J),[2] and International Galalith A.G. (Phenodur).[1] Their findings had been released to the German aircraft industry in a report which was submitted to a meeting of the Tooling Engineers in 1944, but apparently the industry as a whole had made small use of this information. The Junkers experiments show that only Phenodur was suitable for casting forming-dies or drill jigs. The other cast phenolic resins gave uncontrollable shrinkage during the curing process, lacked stability on aging, and were generally weak and brittle. A satisfactory process using Phenodur was worked out, whereby it was claimed that forming dies could be fabricated in $^1/_{20}$ of the time and at $^2/_3$ the cost of dies made from Pressholz.[2] It was claimed that the production characteristics of the cast dies were similar to those of Pressholz both in life and quality. However, repairs could not be made as easily. No comments were recorded regarding the possible corrosive action of the acid catalyst which was used to harden the resin. It was customary to use *p*-toluenesulfonic acid as a catalyst. The few trial phenolic tools were fitted with back-up plates of Pressholz.

Elaborate plans were detailed for the installation of a central tool casting shop in the main Junkers factory. Figure 1 (p. 126) shows schematic drawings of the steps in the casting process from the master part to the finished tool ready for transportation. Figure 2 shows the casting area.

Thermoplastic compositions

Junkers had also experimented with a thermoplastic composition, Diaktol. It was found, as a result of preliminary experiments, that this thermoplastic composition could not be used for highly stressed forming tools, because of its low stability and its tendency to deform due to cold flow in use and even during storage.

One other firm, Dynamit A.G., had tried to develop thermoplastics for tooling applications. Mipolam,[2] a thermoplastic polyvinyl composition, had been investigated as a thermoplastic punch and as a medium for rubber-forming of light metals (Table I). For normal forming operations, a combination of type MP/K 190 and type MP/K 6569 was recommended. The body of the punch was formed of the type MP/K 190 material and was faced with about 1 in. of type MP/K 6569. If the punch was also to perform blanking operations, an additional face of 0.5 to 1 in. of type MP/K 6568 was added to increase the surface hardness.

The punch was prepared for mounting in the press by heating a slotted iron plate and forcing it into the upper surface of the punch. The iron plate was machined so that it had a series of parallel grooves wider at the bottom than at the top. Thus the heated thermoplastic material was forced into an expanding cavity and interlocking was provided. It was claimed that the punches produced satisfactory parts and that complicated forms could be produced. The punches were used against metal dies, usually steel or aluminum, or against Pressholz. In form- (*Please turn to page 184*)

Table I.—Properties of Polyvinyl Tooling Compositions

Property	*Mipolam MP/K 190*	*Mipolam MP/K 6569*	*Mipolam MP/K 6568*
Tensile strength, p.s.i.	995	1700	2125
Elongation to rupture, %	350	300	250
Shore hardness	50	65	80
DVM hardness	90	70	30
Specific gravity	1.22	1.27	1.30

Plastics Digest*

This digest includes each month the more important articles of interest to those who make or use plastics. Mail request for periodicals directly to publishers.

General

ETHYL SILICATES. H. D. Cogan and C. A. Setterstrom. Ind. Eng. Chem. *39*, 1364–8 (Nov. 1947). The esters of silicic acid were the first organic silicon compounds to achieve commercial importance. Monomeric ethyl silicate and its polymers are large-tonnage industrial chemicals manufactured from silicon tetrachloride and ethanol by a continuous process which eliminates batch-to-batch variations. The important commercial applications hinge upon the ability of ethyl silicate to deposit silica from solution, so the techniques of hydrolysis and polymerization are important. Recent advances include the development of useful aqueous systems without mutual solvents, and the large-tonnage availability of a stable liquid polymer with an equivalent silica content of 40 percent. The ethyl silicates are used as adhesives for investments in precision casting, binders for ceramics, gelling agents for alcohol fuels, sources of finely divided amorphous silica, building stone impregnants for weatherproofing, and in the preparation of glass adherent lacquers.

PLASTICS INDUSTRY "DOWN UNDER" LOOKS UP. E. Bee. Plastics (London) *11*, 399–403 (Aug. 1947). The plastics industry in Australia is described. There is a high production of laminates and moldings in this country. Practically all types of plastics are used. The types made in Australia include urea and phenolic molding, laminating, coating, adhesive and casting resins, and casein plastics. All other types are imported.

ELASTOMERS. H. L. Fisher. Ind. Eng. Chem. *39*, 1210–12 (Oct. 1947). Developments in the field of natural and synthetic rubber since the beginning of World War II are reviewed. There are 60 references.

WOOD. A. J. Stamm. Ind. Eng. Chem. *39*, 1256–61 (Oct. 1947). Developments in the field of wood products since the beginning of World War II are reviewed; 102 references.

Materials

SILICONE RESINS. J. R. Patterson. Ind. Eng. Chem. *39*, 1376–9 (Nov. 1947). Silicone resins are a recent addition to the list of vehicles and binders of interest to the protective and decorative coatings industry. They offer several properties which are not obtained with other resins and provide an unusual combination of resistance characteristics. Their use will permit the attainment of new levels in resistance to heat, chemicals, and weather. When their cost is lower, they will find general use in many types of finishes. Several modified silicone resins can be made, and those modified with alkyd resins are particularly promising. They possess most of the desirable characteristics and few of the disadvantages of the individual members.

MULTI-INGREDIENT POLYAMIDES W. E Catlin E. P. Czerwin, and R. H. Wiley. J Polymer Sci. 2, 412–19 (Aug 1947) Multi-ingredient polymeric amides were prepared by the condensation under amide-forming conditions of various combinations and ratios of components comprising hexamethylenediammonium adipate, hexamethylenediammonium sebacate, and ε-aminocaproic acid or ε-caprolactam. The physical properties of the investigated linear polymeric amides range depend ng upon the polymer components and the proportions employed, from high-softening, stiff, and difficulty soluble compositions to relatively low-softening, pliable, easily soluble polymers.

BUILDING MATERIAL FROM WOOD WASTE BY HIGH-FREQUENCY HEATING. Plastics (London) *11*, 455–6 (Sept. 1947). A building board is made by bonding wood wastes into sheet form with a synthetic resin by use of high-frequency heating.

Molding and fabricating

PRINTING THE NEW PLASTIC FILMS. Modern Packaging *20*, 82–6 (Aug. 1947). The silk screen, gravure, aniline, typographic, and lithographic methods of printing on plastic films are described briefly. Methods for printing on polyethylene, ethyl cellulose, polyvinyl chloride acetate, rubber hydrochloride, polyvinylidene chloride, and polyvinyl alcohol films are discussed.

SPECIAL PROBLEMS OF HIGH-FREQUENCY WELDING OF VERY THIN PLASTIC SHEETS J. Freeman and H. P. Zade. Plastics (London) *11*, 472–8, 505 (Sept. 1947). Theoretical reasons for the fact that very thin plastic sheet materials require considerably higher power densities than thicker materials are discussed. Practical experience substantiates the theoretical figures. The difference in power requirements is markedly reduced by a preheating method.

SOFTENING THERMOPLASTIC SHEET BY RADIANT HEAT. L. J. C. Connell and G. M. Hogarth. Plastics (London) *11*, 414–19 (Aug. 1947). Thermoplastic sheets are softened for forming by infrared heating lamps. The temperatures obtained with various thicknesses and times, the energy acquired, and cost of heating of methyl methacrylate plastic sheets in horizontal and vertical positions were investigated.

Applications

SILICA-FREE BOILER FEED WATER BY ION EXCHANGE. W. C. Bauman, J. Eichhorn, and L. F. Wirth. Ind. Eng. Chem. *39*, 1453–7 (Nov. 1947). The complete removal of silica from water has been attained with ion exchange resins. Silica is converted to fluosilicic acid and removed as such by an anion resin. Three methods of fluoride addition for silica removal and six different anion resins were used in the study. Alkali regeneration of exhausted anion beds must be preceded by acid or salt treatment to avoid precipitation of silica in the anion exchangers. Cost considerations show that this method of silica removal is best suited for silica concentrations below 10 parts per million.

PLASTIC FILM LOCKS THREADED PARTS. Iron Age *160*, 66 (Aug. 28, 1947). Screw threads are coated with a vinyl resin film to prevent loosening and corrosion. A film 0.002 to 0.004 in. in thickness is applied, allowed to dry partially and then threads engaged while the coating is sticky.

Coatings

HIGH-SOLIDS METAL LACQUERS. J. K. Speicher. Canadian Chem. Process Ind. *31*, 214–17 (Mar. 1947). A reasonably high-solids content lacquer with good durability and generally satisfactory properties can be obtained by using two parts of nonoxidizing alkyd to one part of cellulose nitrate. Modification of this combination can be made by adding small amounts of urea or melamine resins, or not more than one part of an oxidizing-type alkyd. Another modification is to use some plasticizer and a lesser amount of resin.

* Reg. U. S. Patent Office.

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Technical Briefs

Abstracts of articles on plastics in the world's scientific and engineering literature relating to properties and testing methods, or indicating significant trends and developments.

Engineering

REVOLUTION IN RADIO MANUFACTURE. Plastics (London) *11*, 350–1 (July 1947). A machine for producing printed circuits on a sheet of phenolic plastic for use in small radios is described.

CODIFICATION OF MATERIALS. C. S. Grove, Jr., J. W. Perry, and R. S. Casey. Ind. Eng. Chem. *39*, 1261–4 (Oct. 1947). Codification systems for materials, chemical deteriorating influences, equipment, forms, methods of fabrication, and physical properties are developed herein.

RATES OF ANION EXCHANGE IN ION-EXCHANGE RESINS. R. Kunin and R. J. Myers. J. Phys. & Colloid Chem. *51*, 1111–30 (Sept. 1947). A study of the rates of anion exchange in resinous exchangers indicates the rate-determining step to be the diffusion of ions through the gel structure and shows that the rate is dependent upon factors such as 1) particle size, 2) ion species, 3) concentration, 4) temperature, 5) degree of exchange saturation, 6) degree of hydration of resin, and 7) degree of mixing of exchangeable ions.

Chemistry

INTRINSIC VISCOSITIES AND MOLECULAR WEIGHTS OF POLYVINYL ACETATES. R. H. Wagner. J. Polymer Sci. *2*, 21–35 (Feb. 1947). A polyvinyl acetate polymer of medium viscosity was fractionated into 16 fractions (first series) and 3 of the larger of these further separated into 20 subfractions (second series). The intrinsic viscosities $[\eta]$ and the osmotic pressure molecular weights (M) were determined at 25° C. and the relation between them was found to be expressed by the equations: first series: $[\eta] = (1.88 \times 10^{-4}) M^{0.69}$; second series: $[\eta] = (1.76 \times 10^{-4}) M^{0.68}$. The data indicate that little, if any, increase in homogeneity is to be expected by further fractionations and that the equations applicable to the second fractionation series are representative of essentially homogeneous polyvinyl acetates in acetone. An equation applicable to fractionated and unfractionated vinyl acetate polymers is described that is useful in obtaining the intrinsic viscosity from a single viscosity measurement. Several unfractionated materials from different sources were also studied and the calculated ratios of the viscosity-average to the number-average molecular weight indicate that the degree of heterogeneity of chain-length distribution increases with increasing average molecular weight.

HEATS OF POLYMERIZATION OF SOME UNSATURATES. L. K. J. Tong and W. O. Kenyon. J. Am. Chem. Soc. *69*, 2245–6 (Sept. 1947). The heat of polymerization of methyl acrylate was found to be 18.7 ± 0.2, of vinyl acetate 21.3 ± 0.2, of acrylonitrile 17.3 ± 0.5, of vinylidene chloride 14.4 ± 0.5 kcal./mol.

MAGNETIC ROTATION STUDY OF POLYMERIZATION OF STYRENE. P. A. Giguère. J. Polymer Sci. *2*, 296–300 (June 1947). The thermal polymerization of styrene in vacuo was followed by measuring the change of its magnetic rotatory power. The degree of polymerization was determined from measurements of the refractive index, viscosity, and density. The Verdet constant of the monomer at 25° C. was found to be 0.0338 min. per gauss per cm.; it showed no appreciable change on polymerization. Because of experimental difficulties the measurements could not be made beyond 25% polymerization.

DEPOLYMERIZATION OF CHAIN MOLECULES BY ULTRASONIC WAVES. CONCENTRATION EFFECTS. G. Schmid, E. Beuttenmüller, and A. Reif. Kunststoff-Tech. u. Kunststoff-Anwend. *13*, 65–70 (1943); Chem. Abstracts *40*, 6940 (Nov. 20, 1946). Solutions of cellulose nitrate in butyl acetate, of polystyrene in toluene and of rubber in toluene were subjected to ultrasonic vibrations at 284,000 cycles per sec. and the degradation determined from measurements of viscosity. The amount of depolymerization increased for the cellulose nitrate and decreased for the other two as concentration of solutions was increased.

MEASUREMENT OF THE GAS PERMEABILITY OF SHEET MATERIALS. L. C. Cartwright. Ind. Eng. Chem., Anal. Ed. *19*, 393–6 (June 1947). Several types of gas permeability testers previously reported in the literature are discussed and their sensitivities compared. An instrument of new design, made entirely of Pyrex, is described. Its sensitivity is some six times that of previous gas permeability instruments, permitting detection within 24 hr. of permeabilities as low as 0.052 cc. (N.T.P.) per square meter per 24 hr. per atmosphere.

OXYGEN AS A COMONOMER IN THE EMULSION POLYMERIZATION OF STYRENE. F. A. Bovey and I. M. Kolthoff. J. Am. Chem. Soc. *69*, 2143–53 (Sept. 1947). By direct measurement of the rate of oxygen consumption during the induction period caused by oxygen in the emulsion polymerization of styrene at 50° C., it was found that the reaction of oxygen during the induction period is essentially zero order with respect to oxygen pressure, nearly independent of the concentration of emulsifier, and directly proportional to the concentration of persulfate. The oxygen consumed during the induction period is largely accounted for. It reacts mainly to form a polymeric styrene peroxide, and to a minor extent to produce benzaldehyde and formaldehyde. A polymer was isolated which has a composition corresponding to a 1:1 copolymer of oxygen and styrene. This copolymer contains of the order of 40 styrene peroxide units. A chain mechanism is proposed to account for the observed kinetics and products of the reaction of styrene with oxygen during the oxygen induction period. The rate of copolymerization of styrene with oxygen is of the order of a thousandth smaller than the normal rate of emulsion polymerization of styrene in a recipe which contains the standard amount of soap.

ACENAPHTHYLENE AND ITS POLYMERIZATION PRODUCTS. R. G. Flowers and H. F. Miller. J. Am. Chem. Soc. *69*, 1388–9 (June 1947). Two improved methods for the preparation of acenaphthylene are described. A high molecular weight polymer of acenaphthylene and polymerization products of acenaphthylene with vinyl carbazole, styrene, methyl methacrylate and vinyl acetate were prepared. Polyacenaphthylene is a white powder with a molecular weight over 150,000. The copolymer with vinyl carbazole is a white powder with a softening point above 200° C. and a vinyl carbazole content of 81 percent. The copolymer with styrene is a white powder with a softening point of 150° C. The copolymer with methyl methacrylate is a white powder with a softening point of 160° C. The copolymer with vinyl acetate has a softening point of 180° C. All these resins are soluble in benzene and trichloroethylene and insoluble in methyl alcohol, acetone and ether.

PYROLYSIS OF POLYTETRAFLUOROETHYLENE. E. E. Lewis

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SYNTHETIC RESINS • CHEMICAL COLORS • PHENOLIC PLASTICS • INDUSTRIAL CHEMICALS

and M. A. Naylor. J. Am. Chem. Soc. *69*, 1968–70 (Aug. 1947). The thermal degradation of polytetrafluoroethylene was carried out at 600 to 700° C. and at pressures of 5 to 760 mm. A mechanism is proposed to account for the fact that tetrafluoroethylene was formed in increasing amounts as pressure was decreased and was the sole product at very low pressures.

Properties

DIFFUSION OF WATER THROUGH PLASTICS. G. Deeg, Jr. Bell Lab. Record *25*, 227–30 (June 1947). The diffusion of water through various types of plastics was measured. None of the materials tested were totally impermeable to water vapor. The diffusion constant was independent of the thickness of the specimen at equilibrium which is in agreement with Frick's law. Values for phenol-formaldehyde, cellulose acetate, polyethylene, polystyrene, polyvinyl acetate, ethyl cellulose, cellulose acetate butyrate, cellulose triacetate, cellulose acetate propionate, polyvinyl chloride, polyvinyl chloride acetate and polyamide are reported Unplasticized cellulose derivatives are very permeable to water vapor; the lower the hydroxyl content, the less the permeability. Plasticizers may change the permeability of plastics either way. Adding wax reduces the permeability. Non water-sorbing fillers reduce the permeability but water-sorbing fillers increase the permeability. The method of preparing the test specimens also affects the permeability. The higher the water content of a plastic, the greater the permeability.

DEVELOPMENT OF JOINT STRENGTH IN BIRCH PLYWOOD GLUED WITH PHENOL-, RESORCINOL- AND MELAMINE-RESIN GLUES CURED AT SEVERAL TEMPERATURES. H. D. Bruce, W. Z. Olson, J. M. Black, and A. H. Rauch. U. S. Dept. Agr., Forest Products Lab. Report. No. 1531, 4 pp. (1946). The effects of time and temperature in the curing cycle on the strength of 14 synthetic resinous adhesives used to make plywood are reported. The joints increased in strength with increases in time and temperature of curing until the joint equaled the wood strength. The wet and dry strengths were not significantly different.

LOW TEMPERATURE IMPACT STRENGTH OF CELLULOSIC PLASTICS. W. E. Gloor. Ind. Eng. Chem. *39*, 1125–9 (Sept. 1947). Exploration of the effects of plasticizers, degree of substitution, and intrinsic viscosity of ethyl celluloses and cellulose acetates used in plastics showed that both choice of plasticizer and use of a cellulose derivative of high intrinsic viscosity aid in producing materials of improved low temperature impact strength. As to plasticizers, the coefficients of viscosity change with temperature, and the amounts of loosely bound plasticizer seem significant. Use of ethyl cellulose with an intrinsic viscosity above 1.3 and of cellulose acetate approaching an intrinsic viscosity of 2 also enhances subzero impact properties.

EFFECT OF HUMIDITY ON PROPERTIES OF PLASTICIZED ETHYL CELLULOSE. W. P. Moeller and N. Taylor. Ind. Eng. Chem. *39*, 1149–52 (Sept. 1947). The purpose of this investigation was to study the effect of varying humidities on the properties of plasticized ethyl cellulose, using a typical nonsolvent and a typical solvent modifier. Standard A.S.T.M. procedures were used for such properties as Izod impact, flexural, and tensile strengths as well as Rockwell hardness and heat distortion. Comparison of the effect of humidity with that of plasticizer content shows that the absorbed moisture increases the values for all these properties except impact strength. The similarity in the changes of properties of the two types of modifiers with increasing moisture content is discussed. The results indicate the necessity for a review of the method for defining plasticizers used in ethyl cellulose.

Testing

A NEW METHOD FOR MEASURING THE TIME OF SETTING GEL-FORMING SYSTEMS. G. S. Hattiangdi and S. S. Dharmatti. Current Sci. *14*, 300–1 (1945). The time of setting of gel-forming systems is determined by vibrating a fork with stroboscopic apparatus in the solution. The magnitude of the ripples on the surface decreases as the viscosity increases. When the propagation of the ripples ceases completely, the gel has formed. The accuracy is 2 to 3 percent. The determination is independent of the frequency of vibration of the fork and the size and shape of the vessel. It can be used for opaque and colored systems.

WATER VAPOR PERMEABILITY OF PACKAGES. Modern Packaging *20*, 129, 170 (Aug. 1947). A tentative method for determining the water vapor peremeability of shelf packages, A.S.T.M. Method D 895–47 T, is described.

LOW TEMPERATURE CHARACTERISTICS OF ELASTOMERS. S. D. Gehman, D. E. Woodford and C. S. Wilkinson, Jr. Ind. Eng. Chem. *39*, 1108–15 (Sept. 1947). The low temperature stiffening of elastomers frequently limits their usefulness. A new laboratory test for measuring their stiffness at low temperatures is described. Strips of the stocks to be tested are mounted around a cylindrical rack in a vertical, cylindrical chamber. The temperature in the chamber is controlled by cooling the base externally with dry ice and by a moderate regulated flow of precooled air through dry ice in the bottom of the chamber. This system gives stable temperatures which are easily controlled. The chamber can be rotated to attach the samples in succession, by means of projecting top grips, to a suitably mounted torsion wire. The stiffness is measured by the angle twist of the sample when the torsion head is rotated 180°. The relative modulus for any temperature is calculated as the ratio of the modulus at this temperature to that at 25° C. Plots of angle of twist against temperature show a rather sharp break at the low temperature end of the curve. This determines a somewhat subjective "freezing point." Curves are given to illustrate the wide variety of low temperature stiffening characteristics for elastomers. In unplasticized stocks the chemical composition of the monomers is the dominating factor for these properties for various synthetic rubbers. The stiffness of elastomers which are capable of crystallization upon stretching, such as Hevea, neoprene, and butyl rubber, depends not only on temperature but also on time of exposure.

Synthetic rubber

MECHANISM OF EMULSION COPOLYMERIZATION OF STYRENE AND ACRYLONITRILE. R. G. Fordyce. J. Am. Chem. Soc. *69*, 1903–4 (Aug. 1947). Data obtained from a study of the relative rates of copolymerization of styrene and acrylonitrile in emulsion polymerizations carried to high conversions are interpreted as giving support to an oil phase mechanism for emulsion polymerization.

PLASTICIZER-FILLER MIXTURES AND THEIR DISPERSION IN RUBBER. F. S. Rostler and H. I. du Pont. Ind. Eng. Chem. *39*, 1311–22 (Oct. 1947). Conventional methods of incorporating plasticizers and fillers into rubber mixtures have many shortcomings inherent in the method of separate incorporation of these two ingredients. The investigation reported in this paper deals with a method of simultaneous incorporation of fillers and plasticizers in the form of premixed preparations. It was found that the ratio of filler to plasticizer of such premixed preparations is the deciding factor in their usefulness. A fixed ratio of filler to plasticizer exists for each filler limiting the amount of plasticizer. The relation between the plasticity and this ratio was investigated, and the experimental data are presented in tables and graphs. It was found with most fillers that the ratio of filler to plasticizer in a premixed preparation should be such that the addition of the mixture to the masticated rubber does not increase its plasticity over that of the masticated rubber itself. Examples are given for this general rule and for exceptions to this rule.

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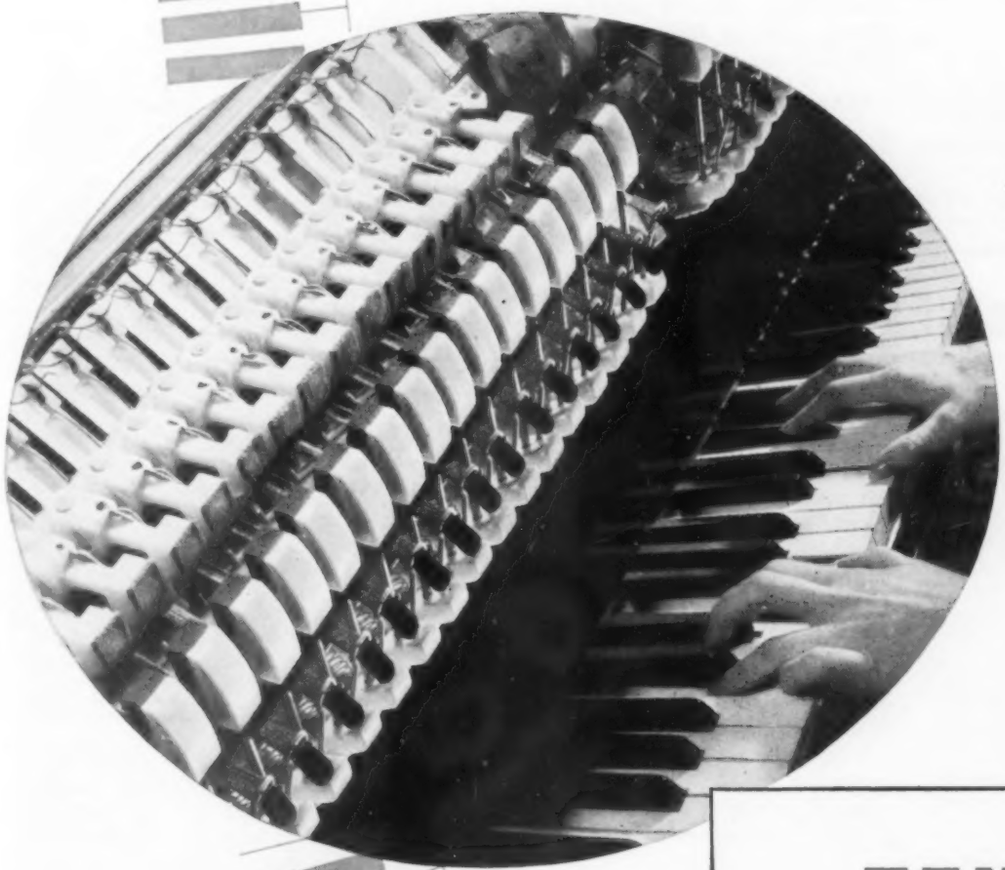

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U. S. Plastics Patents

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VULCANIZING RESIN. L. F. Reuter (to B. F. Goodrich Co.). U. S. 2,427,070–1, Sept. 9. A plasticized polymer of a halogenated ethylene is vulcanized by incorporating in said polymer a reaction product of ammonia with a saturated aldehyde and heating at a temperature of 300 to 350° F. for 10 to 100 min. in the absence of sulfur.

WOOL TREATMENT. J. Kamlet, M. Weisberg, and L. Beer. U. S. 2,427 097, Sept. 9. A process for chlorinating wool and other keratinous fibers comprising treating with formaldehyde or a formaldehyde-yielding compound and treating with a chlorine derivative of ammonium bisulfite.

TEXTILES. H. Dreyfus. U. S. 2,427,126, Sept. 9. A process for the manufacture of shaped articles which comprises saponifying artificial threads, foils, or similar articles of a polyvinyl ester compound by means of a solution of a caustic alkali dissolved in a monohydric alcohol containing at least six carbon atoms.

DIAPHRAGMS. F. V. Sander and C. H. Coles (to Ortho Pharmaceutical Corp.). U. S. 2,427,305, Sept. 9. Diaphragms are made by positioning a circular spring at a predetermined position upon a mold, retaining the spring in said position, dipping the mold into a liquid plastic organic polymer until the spring is contacted by the plastic, removing, permitting the plastic to solidify sufficiently to anchor the spring to the coating, rolling the spring on the skirt a predetermined number of turns, and allowing the coating to completely solidify.

CELLULOSE ESTERS. C. I. Haney, M. E. Martin, and A. J. Rosenthal (to Celanese Corp. of America). U. S. 2,427,403, Sept. 16. A process for the preparation of cellulose acetate which comprises acetylating with acetic anhydride in the presence of acetic acid and sulfuric acid as a catalyst, neutralizing up to 100% of the sulfuric acid, raising the mixture up to ripening temperature and ripening while adding water continuously.

HEATED WIPER. L. Marick (to U. S. Rubber Co.). U. S. 2,427,502, Sept. 16. A heated wiper for windshields comprising a bar-like holder, a flexible wiping strip attached to said folder, a spreader for holding the wiping portion in a laterally extended condition, a sheet of electrically conductive plastic composition secured to said strip, and conductors for supplying operating current to heat the wiping strip.

RESINS. W. L. Morgan (to American Maize-Products Co.). U. S. 2,427,503–4, Sept. 16. Aldehyde-reactive prolamine-base proteins are cured by compounding to substantial homogeneity a non-liquid mass comprising said protein and a curing aldehyde at a mixing temperature below a curing temperature in the vicinity of 120° C. to form a curable mix or compound and including an unsymmetrical substituted carbamide and curing by heating above 120° C. whereby the carbamide selectively reacts with the aldehyde and subsequently releases aldehyde for selective reaction with the protein.

SEALED CABLES. G. M. Powell III and J. E. Brister (to Carbide and Carbon Chemicals Corp.). U. S. 2,427,507, Sept. 16. The interstices of a flexible electrical cable containing stranded wires are filled by applying, prior to stranding and cabling, a pasty fluid suspension, having sufficient internal cohesiveness to adhere to the strands composed of a suspension of a finely divided, highly polymerized vinyl chloride resin in 60 to 150 parts of plasticizer per 100 parts of resin, twisting the strands in the presence of the suspension to form stranded elements of cable having said suspension evenly distributed throughout the interstices of the stranded elements, heating the suspension while so distributed to a temperature of 300° F., and cooling to form a resilient composition.

RESIN. M. J. Scott (to Monsanto Chemical Co.). U. S. 2,427,512, Sept. 16. A composition comprising the condensate of a primary mono-amino-diphenyl free from aldehyde-reactive substituents and one molecular proportion of the addition product of one to four molecular proportions of an aldehyde with one molecular portion of dicyandiamide.

COPOLYMER. C. I. Spessard (to Carbide and Carbon Chemicals Corp.). U. S. 2,427,513, Sept. 16. A copolymer of vinyl chloride with vinyl acetate having an average molecular weight above 16,000 and a combined vinyl chloride content of 90 to 97% is dispersed by grinding 10 to 25 parts of said copolymer at a speed of 22 to 350 r.p.m. below 50° C. with a dispersant comprising a mixture of a liquid ketone with an aromatic hydrocarbon, or a liquid ketone with an aliphatic hydrocarbon, and forming a stable suspension in which the particles have an average diameter less than 10 microns.

ADHESIVE. L. L. Blyler (to Compo Shoe Machinery Corp.). U. S. 2,427,519, Sept. 16. An outsole of non-vinyl resin material is attached to a plasticized vinyl resin shoe upper by coating the attaching face of the outsole with a butadiene-acrylonitrile base adhesive and allowing to dry thereon, coating the overlasted margin of said upper with a vinyl resin base adhesive containing a chrome salt and allowing it to dry, heat activating the adhesive on the outsole and thereafter pressing to effect a permanent bond.

LAMINATED UNIT. T. K. Gregorius (to Pittsburgh Plate Glass Co.). U. S. 2,427,557, Sept. 16. A laminated transparent panel is prepared by cutting a flexible metal strip transversely through a major portion of its width at a number of locations to define multiple strip sections joined together, applying the sectional metal strip along the marginal portion of interlayer sheet material of plastic material, applying the transparent sheet on opposite sides of the interlayer and strip metal with the metal disposed along the marginal portion of the structure and bonding with heat and pressure.

FLASHLIGHT CASE. F. A. Keller (to Bright Star Battery Co.). U. S. 2,427,561, Sept. 16. A plastic casing for a flashlight.

CAN SEALING. H. W. Nagle and J. H. Haines (to Mimex Co., Inc.). U. S. 2,427,618, Sept. 16. A rubber latex base liquid sealing compound possessing thixotropicity and which gels on heating comprising a stable mixture of rubber latex dispersion and a cold-water-soluble methyl cellulose solution.

POLYMERS. L. N. Whitehill and E. C. Shokal (to Shell Development Co.). U. S. 2,427,640, Sept. 16. A polymerizable diester of sulfonyl diglycolic acid with an aliphatic beta mono-olefinic monohydroxy primary alcohol of not more than 18 carbon atoms and having a terminal methylene group.

CEMENT MIXTURE. N. C. Ludwig (to Universal Atlas Cement Co.). U. S. 2,427,683, Sept. 23. A cement capable of forming a fluid slurry when mixed with water, said cement having a retarded set at temperatures above atmospheric, said cement comprising a hydraulic cement

mixed with a minor proportion of either carboxymethyl cellulose or salts thereof.

BEARING. A. Latham, Jr. (to A. D. Little, Inc.). U. S. 2,427,730, Sept. 23. A bearing comprising, in combination, two movable bearing members and means for supplying water as lubricant, one member comprising a synthetic resin resistant to boiling water such as a phenol-aldehyde or melamine-aldehyde resin and containing mineral fiber and a solid lubricant and the other surface comprising a metal.

TUBE CLAMP. L. H. Score and J. C. Haepp (to Bendix Aviation Corp.). U. S. 2,427,883, Sept. 23. A tube clamp comprising a loop of soft pliable plastic material having a pair of separate flat end tabs of substantially rigid plastic material embedded in the end portions, tabs having holes for receiving a securing element.

PLASTIC ARTICLE. W. J. Golightly and F. A. Gardina (to E. O. Spotts, Jr.). U. S. 2,427,906, Sept. 23. A waterproof garment made from plastic sheet material.

PLASTIC BATTERY CASE. I. Koretzky and F. A. Keller (to Bright Star Battery Co.). U. S. 2,427,914, Sept. 23. A battery comprising a metal cup containing a cartridge having a centrally arranged electrode and a plastic shell closed at one end fitting over the cup.

EXTRUSION MACHINE. F. T. Griffiths (to W. T. Henley's Telegraph Works Co., Ltd.). U. S. 2,427,960, Sept. 23. A machine for the extrusion of plastic material.

RESISTOR. N. Vasileff. U. S. 2,428,053, Sept. 30. A resistor comprising a core of aluminum oxide, a resistance element wound on the core and an insulating coating consisting of a silicone resin applied directly thereto.

HAIR NET. H. F. Goldsmith. U. S. 2,428,071, Sept. 30. A hair-net comprising a concave generally form-retaining envelope formed of a number of side-by-side chains of synthetic plastic yarn each drawn alternately to juxtaposed chains by floating inlays of synthetic plastic yarn to provide a netted construction molded in situ wherein chains have cohered at their points of contact.

MOLD. L. Raymond. U. S. 2,428,094, Sept. 30. A mold for the production of an arch-shaped set of contiguous artificial teeth in natural relation to each other from a thermoplastic.

POLYAMIDE COLOR FORMERS. D. M. McQueen (to E. I. du Pont de Nemours & Co., Inc.). U. S. 2,428,108, Sept. 30. A hydrophilic synthetic linear polyamide color former containing a plurality of color former units.

COATING MACHINE. W. F. Grupe (to John R. Ditmars). U. S. 2,428,113, Sept. 30. A machine comprising means for applying to a traveling paper web, an aqueous fluid plastic coating in the form of closely spaced mounds and means for leveling said mounds comprising a smoothing roll.

FINGER SHIELD. E. W. Goettel. U. S. 2,428,152, Sept. 30. A finger shield comprising a resilient material adapted to expose a finger nail for the purpose of applying nail polish upon the nail without spreading it upon the finger.

ESCUTCHEON. W. C. Linton (to Fuse Indicator Corp.). U. S. 2,428,167, Sept. 30. A combined switch plate and lamp housing assembly therefor molded entirely from plastic insulating materials.

MOLDING PRESS. A. C. Frankwich and S. M. Martin (to Western Electric Co.). U. S. 2,428,275, Sept. 30. A molding apparatus including a stationary platen and pressing means movable toward and away from said platen.

LINOLEUM PRODUCT. J. W. Kemmler (to Sloane-Blabon). U. S. 2,428,282, Sept. 30. A linoleum composition embodying a filler and a cement, said cement containing oxidized and gelled siccative oil together with a chlorinated resin, said composition being fire resistant.

FRICTION ELEMENT. R. E. Spokes and E. C. Keller (to American Brake Shoe Co.). U. S. 2,428,299, Sept 30. A friction element comprised of a mass of friction material, inert filler, and a friction modifying agent bonded with the heat-reaction product of a mixture of a sulfurizable heat-polymerized linseed oil together with a heat-resistant phenol-aldehyde resin and sulfur.

REINFORCED PLYWOOD. H. W. Collins (to Owens-Corning Fiberglas Corp.). U. S. 2,428,325, Sept. 30. A reinforced plywood member comprising a plurality of plies of wood and at least one layer of fibrous material all bonded together in superposed relation by an adhesive, said fibrous material being in the form of parallelly arranged strands each composed of a multiplicity of glass fibers.

PAPER COATING. E. Cohnhoff (to Attorney General of United States). U. S. 2,428,358, Oct. 7. An artificial resin for paper coating is prepared by adding together a crude phenol such as phenol, guaiacol, or cresol, with formaldehyde, hexamethylenetetramine, ammonia, and tannin, bringing the mass to 70° C., mixing until homogeneous, cooling to 30° C. and separating resulting aqueous colloidal mass.

COPOLYMER VINYL TEXTILES. T. A. Feild, Jr. (to Carbide and Carbon Chemicals Corp.). U. S. 2,428,453, Oct. 7. Highly elastic resilient filaments, threads, yarns, etc., are prepared by applying to a textile article of water-insoluble vinyl resin formed by the copolymerization of a vinyl halide with a vinyl aliphatic ester, an elasticizer in which the resin is insoluble at 25° C., subjecting the coated article to a temperature between 40 and 110° C. for a time sufficient to fix the elasticizer within the article, and thereafter cooling and scouring the article to remove excess plasticizer.

INSULATING FABRIC. G. Slayter (to Owens-Corning Fiberglas Corp.). U. S. 2,428,591, Oct. 7. A pile surfaced acoustical blanket comprising a mat of very fine glass fibers bonded together into a compressible integral body, said fibers having a continuous thin yieldable coating of a resinous film-forming material.

DIELECTRIC COMPOSITION. S. L. Bass (to Dow Chemical Co.). U. S. 2,428,608, Oct. 7. A dielectric composition comprising a major portion of a liquid polymer of an organosilicone wherein each organo group is a lower alkyl radical, and intimately admixed therewith, an inorganic aerogel in a minor proportion corresponding to at least 0.1% of the weight of the polymer and sufficient to increase viscosity whereby the composition may be caused to flow at room temperature and conform to the shape of a cavity.

REINFORCED PLASTIC. H. W. Collins (to Owens-Corning Fiberglas Corp.). U. S. 2,428,654, Oct. 7. A reinforced laminate comprising a plurality of superposed layers of a glass fiber fabric formed of parallelly arranged strands of fibers, said layers being impregnated and adhered together with a resin forming a continuous body, said resin containing a dispersion of short glass fibers which provide reinforcement transversely of the plane of the fabric.

INSERT. G. A. Moore. U. S. 2,428,676, Oct. 7. A metal insert for molded plastic objects comprising a metal block having no longitudinal split therein, said block having a central bore therethrough and elongated lateral external indentations extending lengthwise of the bore defining corresponding internal bosses within said bore adapted to be cut by a screw of a harder metal.

CASTING. L. E. Champer (to Frank H. Rolapp). U. S. 2,428,697, Oct. 7. Thermoplastic resin is cast by forming a melt thereof at a temperature sufficiently above the melting point to obtain a fluid melt, pouring said melt into a mold to form a casting, cooling to congeal same, thereafter heating the surfaces of the mold above the melting temperature of the resin, applying pressure and cooling while under pressure.

. . . plasticize your vinyl compounds with dependable PARAPLEX G-25

When long, hard service is required of vinyl compounds, you can rely on the outstanding non-migratability and permanence of PARAPLEX G-25. This unusual resinous plasticizer has proved itself invaluable in such applications as coated fabrics, upholstery, simulated leather, luggage, and free films for a variety of uses.

PARAPLEX G-25 can improve your products by giving them the following advantages:

1. *Permanence*
2. *Non-migratability*
3. *Low flammability*
4. *Flexibility at low temperatures*
5. *Heat stability*
6. *Non-extractibility*
7. *Freedom from odor and taste*
8. *Resistance to weathering and ultra-violet*

We also manufacture a series of MONOPLEX esters, which meet specialized requirements. If you are working with vinyl compounds, we'll be glad to give you technical assistance in selecting the proper plasticizers to suit your needs.

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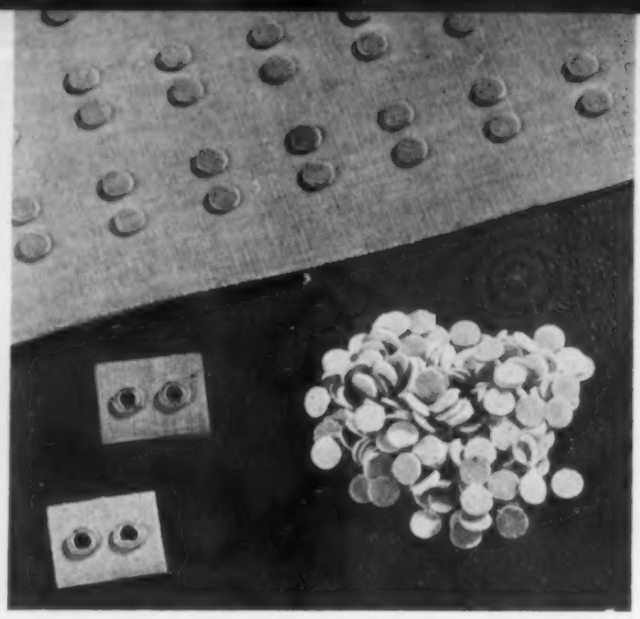
Represented by Cia. Rohm y Haas, S.R.L. Carlos Pellegrini 331, Buenos Aires, Argentina, and agents in principal South American cities

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.



Disks of phenolic resin impregnated fabric are laminated to a sheet of similar material. Holes are punched in disks and sheet cut into rectangles which serve as terminal contact parts for automobile headlight circuits

Smallest preform

used in the production of insulators for electrical circuit

STRICTLY speaking, the tiny disks pictured herewith are not preforms, in that they are not powder squeezed into shape under pressure. In application, however, they act as preforms in the manufacture of a terminal contact part for the headlight circuit of an automobile.

Formica Insulation Co. does this operation by first punching the preforms out of phenolic resin-impregnated fabric based laminated stock.

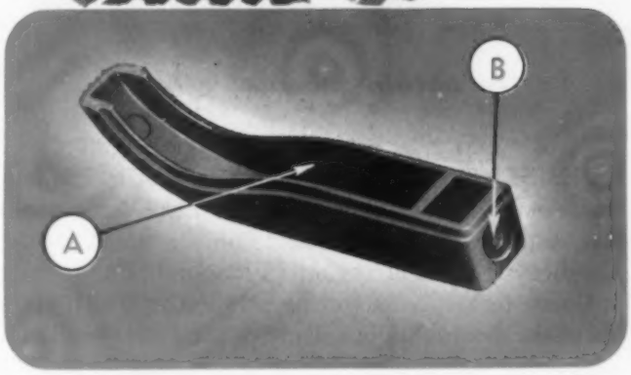
In the laminating assembly a sheet of impregnated fabric is placed over a platen sheet of polished steel, and over the laminating sheet is placed another sheet of steel in which are 384 small holes, placed two together in 8 rows of 24 couples of holes each. The little "preform" disks are placed in these holes in a hand operation and another platen sheet is placed on top. A group of these assemblies are made up and placed in a laminating press. The result is a sheet of cured material to which have been laminated 192 couples of the small disks. This is then fed into a punch press which cuts out the rectangles of material and at the same time punches holes through the center of the disks, thereby making the final product 0.040 in. thick over-all and quite exact in dimension.

PLASTIC PARTS FROM *Stock Molds* PROVIDE ECONOMICAL *Styling . . . Quickly*

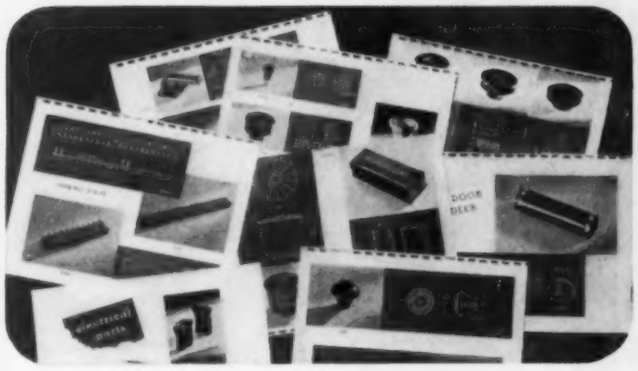
Many times, great economies can be effected . . . costly delays avoided . . . by using a plastic part produced from one of Aico's stock molds.

For example, this 2 cup percolator has the eye appeal, and low cost, popular with buyers largely because of its plastic Aico stock mold handle.

Emson Products Corporation selected this handle because of its smart styling . . . comfortable grip . . . *and the savings in time and costs afforded by the use of a stock mold part.*



Shiny, satiny black phenolic was used for this percolator handle because of its smooth appearance and its resistance to heat. Deep channel construction (A) provides ample strength with a minimum of material. A 3/16" hole (B) is drilled through the butt end to provide for easy, fast assembly. Handle is shaped to fit the grip. The handle is produced in a sixteen cavity, semi-automatic mold in one of our modern high speed presses at the rate of 5,000 pieces a day.



If you need plastic parts in a hurry, let Aico engineers recommend the most suitable for your use from the great assortment of up-to-date Aico stock molds. Write today for your free portfolio of actual Aico Plastics Applications.

AMERICAN INSULATOR CORPORATION
New Freedom, Pa.

AICO PRECISION MOLDING *for over 30 years*

MANY THINGS ARE BETTER BECAUSE OF PLASTICS

Real water falls as "rain" from acrylic clouds in this three-dimensional terminal display

Three dimensional sign

Uses plastic and water to obtain unusual effects

RESISTANCE of stainless steel to rust and corrosion is demonstrated in a new three-dimensional display sign for railroad terminals, made for the Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

A new technique of forcing perspective which gives the effect of actuality in a depth of not more than 12 in. is accomplished through the use of Plexiglas, fluorescent lighting, and wood. The eye-catching display, $7\frac{1}{2}$ by 9 ft., shows "raindrops" tumbling down from acrylic clouds onto a bar of stainless steel. The background is lighted by fluorescent tubes. The "raindrops," pumped from a tank at the bottom of the display to another tank behind the clouds, emerge from an unseen sprinkler, also behind the clouds.

Acrylic is also used to form the star trademark, the blue ribbon etched with the words "Stainless Steel" which darts under the bar and emerges as an arrow, and faces of the letters spelling "Allegheny Metal." Lettering on star and ribbon is silk screened on. The display was developed through the cooperation of Walker-Downing Advertising Agency, Pittsburgh, Pa., and McArthur Advertising Corp. McArthur constructed the sign in its Long Island City, N. Y., plant.

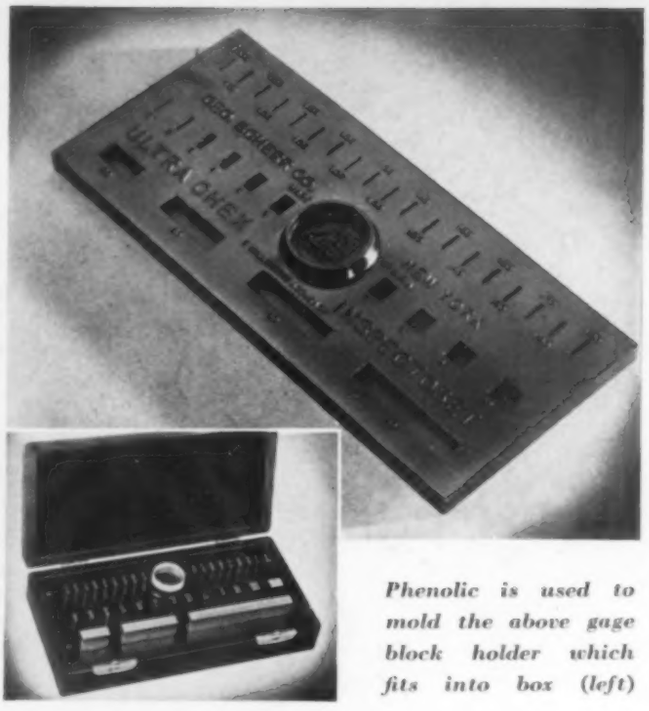
For sharper edges

CELLULOSE acetate has been used in the housings of two new type sharpeners and in the packaging of one to heighten sales appeal, to provide a variety of pleasing colors, durability, economy, and ease of operation.

The Robo knife sharpener, seen above, operating on the grindstone principle, grinds knives uniformly sharp the entire length of the blade. It is marketed by the Alden Speare's Sons Co., Cambridge, Mass.

Ruby-red transparent cellulose acetate wheels, molded in four parts by Century Plastic Co., Hudson, Mass., support the vitrified aluminum oxide grindstone. Each two-part wheel is joined under the rubber tread by a cemented snap-fit. The package, designed by Creative Packaging Service, Boston, Mass., and made by Atlantic Paper Box Co., Boston, Mass., has a transparent cellulose acetate cover reverse printed in a gold color, and a base of embossed gold foil.

A professional edge can be restored quickly to scissors and shears with the handy Aladdin blade-edger, below, put out by the New England Carbide Tool Co., Inc., Cambridge, Mass. The cellulose acetate housings, which come in red, neutral, or blue, are injection molded by the Morningstar Co., of Cambridge, Mass.



Phenolic is used to mold the above gage block holder which fits into box (left)

Gage block holder

GREATER protection and longer service at a saving in cost have been effected by a switch from wood to plastic in gage block holders manufactured by the George Scherr Co., Inc., New York City.

Phenolic selected

In the past, cases have been made of wood. These were individually made and as a result were fairly expensive to produce. When the Scherr Company recently designed new holders, it found that molded Durez phenolic more than filled the necessary requirements of durability and ample protection, and had the added advantage of lower production costs.

Identification molded in

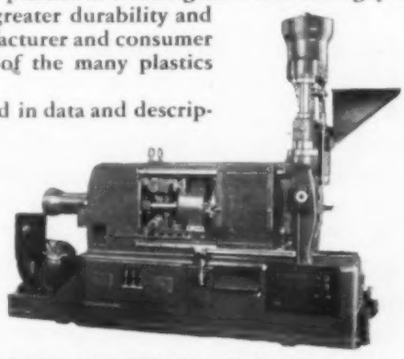
These phenolic holders are produced in one short molding cycle by Tech-Art Plastics Co., Inc., Long Island City, N. Y. As can be seen in the illustration above, the holes for the various required sizes of gage blocks as well as the identification markings for each block are molded in. A round cavity with raised sides is provided to hold the optical flat which is used to check the gage blocks for size and wear.

The holders are set into rectangular boxes (seen in inset above) with hinged tops and snap-type locks. The Ultra-Chex gage blocks, also shown, are accurate to within eight millionths of an in. on sizes up to 1 in. and eight millionths per in. on larger sizes at a temperature of 68° F. They are manufactured on special machinery for large scale and economical production.

Is YOUR Product attending this "PLASTICS" PARTY?

There's a bright new market for plastics products opening wide to molding plants throughout America. Millions of tiny hands are reaching out eagerly for the unusual and distinctive in plastic toys and miniature replicas of "grown-up" items so dear to children in their make believe play world. And plastics molders everywhere are benefiting by the increased demand for new products created by this juvenile market. In every industry the magic of plastics is working its wonders... gayer colors, less weight, greater durability and lower costs to manufacturer and consumer alike are just a few of the many plastics advantages.

If you are interested in data and descriptive literature that deals with plastics development or injection molding equipment, please feel free to contact us. No obligation.



NO OTHER INJECTION MOLDING MACHINE HAS ALL THESE COST-CUTTING FEATURES

• Vertical injection with internally heated torpedo • One piece, rigid, cast alloy steel frame • Larger, stronger die height adjusting screw. • Automatic ejection (16 ounce and over). • Electrical, mechanical and hydraulic safety guard.

LESTER INJECTION MOLDING MACHINES

Distributed by **LESTER-PHOENIX, INC.**

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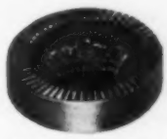

Checkers of GLADITE have smooth, lustrous finish that's colorfast and highly resistant to abrasion and chipping.

Strong GLADITE bottle caps withstand high torques . . . are proof against water, greases, oils, alcohols.

Building block of GLADITE has high compression strength, dimensional stability, resists scratching and chipping.

Good dielectric properties, heat resistance to 500° F, high tensile strength distinguish GLADITE electrical components.

The new GLADITE cold mold compound—produced in a wide range of brilliant colors—makes COLD-MOLDING, in the literal sense of the word, a reality.

No preliminary heating—no after baking—ONE STROKE—IT'S DONE! With GLADITE the *initial* preforming operation becomes the *finished* operation.

No specially designed equipment is required for processing. Standard rotary, single—stroke or hydraulic presses may be utilized. On automatic presses cold molded articles can be turned out at rates of from 1,000 to 30,000 per press per hour!

GLADITE'S *low bulk factor* and favorable specific gravity mean more molded units per pound. If large quantities, speedy production and low cost per unit are important factors in your manufacturing program, investigate the new cold-molding process made possible by GLADITE.

A dry, granular, free-flowing powder—GLADITE is available for prompt shipment in *any color*. Each color is fast . . . each is uniform.

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Reg. U. S. Pat. Off.

Write today on your business letterhead for a free sample canister.

MYLER PLASTICS CORPORATION

Cold Mold Plastic Powders

92 BISHOP STREET JERSEY CITY 4, N. J.

When folded up, the infant's training seat doubles as a cover for the adult's toilet seat

Training seat

For youngsters folds up and serves as lid when not in use

PLASTICS are playing an increasingly important role in training seats for infants. Ease of cleaning, color-fastness, moisture-resistance, and rustproofness are among advantages which plastics can give more adequately than other materials.

A new wrinkle in such seats has been introduced with the King Cole Trainer which can be quickly and easily transformed into a lid. This new compact unit. made by Cambridge Industries, Inc., New York, N. Y., resembles a modern, functional cover when closed. When opened up, it becomes a sturdy training seat with arms and back for added comfort. Its design banishes the nuisance of "additional" seats which are placed over the adult seat each time they are used.

The main parts of the new seat—the arms, back, and base—are molded of white Lustron by Worcester Moulded Plastics Co., Worcester, Mass. Polystyrene was selected because of its light weight and dimensional stability. The three molds used to turn out the main parts were designed by Worcester and fabricated in its Die Dept. Because the job involved large, flat pieces, both gating and venting received considerable attention. The original model was styled and produced by P. A. Derham & Associates, Rosemont, Pa.

Opened, a sturdy seat with arms and back is provided for child. Straps hold him securely

A molded-in groove on the back of the seat allows it to be opened for use quite easily

Rear view shows how the trainer is attached to adult seat. Deflector at front is also seen

Consumption of

FOR the first time since the July slump, over-all plastics raw materials consumption for November failed to show an increase. In fact, consumption slipped about 8% from October's record breaking high of 79,150,681 pounds. The biggest break came in phenolics which dropped about 2,400,000 lb. to wind up about 200,000 lb. lower than July's figure of 25,949,239 pounds. This decline was predicted three months ago, but failed to materialize until now. Cellu-

PLASTICS AND SYNTHETIC RESIN CONSUMPTION
From Statistics Compiled by Bureau of

Materials
Cellulose acetate and mixed ester plastics[a]
Sheets
Continuous (under 0.003 gage)
Continuous (0.003 gage and upward)
All other sheets, rods, and tubes
Molding and extrusion materials
Total
Nitrocellulose plastics[a]
Sheets
Rods and tubes
Total
Other cellulose plastics
Phenolic and other tar acid resins
Laminating (dry basis)
Adhesives (dry basis)
Molding materials[a]
All other, including casting (dry basis)[c]
Total
Urea and melamine resins
Adhesives (dry basis)
Textile and paper treating (dry basis)
All other, including laminating (dry basis)[c,d]
Total
Polystyrene[c,e]
Vinyl resins
Sheeting and film, including safety glass sheeting[a]
Textile and paper coating resins (resin content)
Molding and extrusion materials (resin content)
All other, including adhesives (resin content)[c]
Total
Miscellaneous
Molding materials[a,f]
All other (dry basis)[c,g]
Total
Grand Total

[a] Includes fillers, plasticizers and extenders. [b] Data cannot be published without disclosing operations of individual establishments. [c] Excludes data for protective coating resins. [d] Excludes urea and melamine molding materials; see footnote *f*. [e] Dry basis, including necessary coloring materials.

plastics materials

lose acetate and mixed ester plastics, and nitrocellulose plastics also dipped below their July figures.

Polystyrene went down slightly but kept above the 10,000,000-lb. mark. Under vinyl resins, sheeting and film, including safety glass sheeting, gained about 1,300,000 lb., but despite this, other categories slumped to bring November's total down by approximately the same amount. Urea and melamine resins went down about 700,000 pounds.

IN POUNDS FOR JAN. THROUGH NOV. 1947
Census, Industry Division, Chemical Unit

October 1947	*November 1947*	*Total for first 11 months*
lb.	*lb.*	*lb.*
489,980	480,586	6,752,327
1,009,531	756,046	7,229,532
299,331	225,429	3,597,113
5,104,501	4,665,939	54,704,756
6,903,343	6,128,000	72,283,728
767,965	609,314	8,589,229
271,966	222,801	3,454,724
1,039,931	832,115	12,043,953
[b]	[b]	1,685,554[i]
3,477,013	3,241,623	37,033,029
1,964,403	1,892,302	19,149,174
17,886,441	15,415,038	177,155,384
4,801,174	5,170,255	58,378,052
28,129,031	25,719,218	291,716,039
4,596,590	3,904,009	44,243,998
1,425,209	1,535,600	15,227,551
698,165	559,647	7,065,666
6,719,964	5,999,256	66,537,215
10,930,918	10,593,297	83,530,025
5,964,197	7,242,552	58,331,567
1,780,841	1,679,764	15,052,971
7,671,098	5,636,516	65,161,586
2,623,490	2,278,641	24,887,675
18,039,626	16,837,473	163,433,799
4,821,098	4,589,182	51,608,675
2,566,770[h]	2,483,859	26,879,950
7,387,868[h]	7,073,041	78,488,625
79,150,681[h]	73,182,400	769,718,938

[f] Includes data for urea and melamine, acrylic acid and miscellaneous molding materials. [g] Includes data for petroleum resins, acrylic acid ester resins, mixtures and miscellaneous synthetic materials. [h] Revised. [i] The figure given here is for January through April only.

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New Machinery and Equipment

Dielectric heater—Sherman Industrial Electronics Co., Inc., Belleville 9, N. J., has introduced two new Sieco heaters—a small bench-type dielectric heater, SD-1, and a 2-kw. dielectric heater, SD-2.

Type SD-1, shown here, is recommended for the small shop, the production line or laboratory where a small heater is required. The oven door measures 8 by 8 in.; the work plates are 5 by 5 in. and have adjustable separation up to 4 inches. The top electrode swings upward on a spring operated counterbalance when the door is raised.

Type SD-2 is a 2-kw. dielectric heater used for the preheating of preforms, baking, sterilization, etc. Its built-in oven has a door opening 15 in. wide by 9 in. high. The plates are $8^1/_2$ by $8^1/_2$ by $^1/_4$ in. heavy aluminum and plate separation is adjustable to a work height of 6 in. by means of a hand wheel at the top of the unit. It has 72 sq. in. of work area.

Platen press—A pneumatic platen press, Model No. 225, has been announced by M. A. Cuming & Co., Inc., 43–49 Bleecker St., New York 12, N. Y. This machine is recommended for economical production molding by the drawing, forming, and matching mold processes, for handling both thermoplastic and thermosetting plastics, molded and foamed rubber and vinyls, leather, paper, fiber glass preforms, etc. Specifications are: 16-in. stroke, 24-in. maximum daylight opening; 20-in. platen diameter; 4600-lb. total maximum pressure and 125-lb. maximum line pressure.

Drying oven—A double decker double door drying oven unit, Model 3, which gives the advantage of double capacity on single unit floor space has been introduced by Brosites Machine Co., 50 Church St., New York 7, N. Y. The units can be operated independently of each other and, when desired, the top section can be faced in the opposite direction for serving two machines at the same time. There are 20 trays, 15 by 22 by $2^1/_2$ inches. Each tray holds about 10 lb. of average material when placed to a depth of 1 inch.

Electron tubes—Machlett Laboratories, Inc., Springdale, Conn., has developed five new tubes for use in equipment of from 5 to 50 kw. rating, and offered for either initial installation or replacement purposes. Four are available in both air- and water-cooled types; the fifth is water-cooled only. Though primarily intended for RF heating, these tubes can also be used in the communications field.

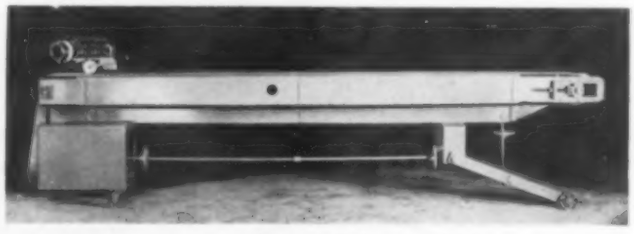
Sealing of box corners—A production machine, the Spectrum Electronic Corner Stayer specifically designed for the electronic sealing of cellulose acetate box corners, is being manufactured by Spectrum Engineers, Inc., 540 N. Third St., Philadelphia, Pa. Based on principles developed by the Eastman Kodak Co.'s Kodapak Demonstration Laboratory, the machine employs an RCA Model 100 AV Generator with a special sealing head to produce a narrow, permanently welded seam. This method promises to speed production, reduce waste, improve box appearance, provide greater uniformity, and eliminate distortion sometimes caused by cementing operations.

Any size container up to a maximum corner depth of 4 in. can be sealed on the machine. Guides on the head align boxes which must be preformed and creased in the usual manner.

Four-roll calender—A Z-type four-roll calender has been introduced by Farrel-Birmingham Co., Inc., Ansonia, Conn. This Z arrangement of the rolls is said to offer a number of advantages in the production of film to accurate, uniform gage. Anchorage of the rolls is by means of hydraulic preloading devices. Roll journals are flood-lubricated and have improved oil seals to safeguard against oil leakage. The drive and connecting gears are inclosed in a separate fabricated steel housing and coupled to the rolls with universal spindles.

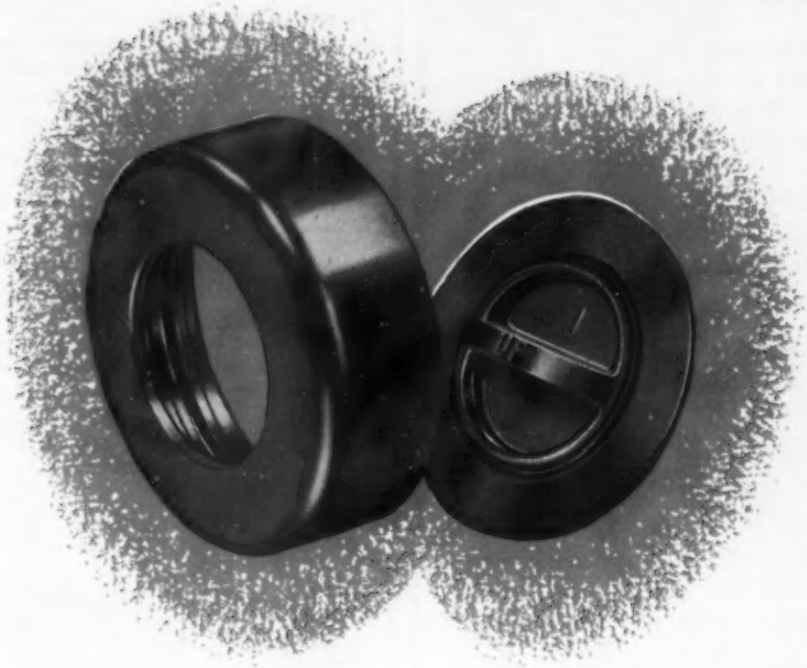
Flat strip take-up and reeler—A "Coil-on" dual unit, facilitating the handling of extruded plastics in strip, ribbon, and/or belt form in any thickness and in widths up to 4 in., without use of auxiliary equipment, has been announced by the Plastex Machine Corp., Box 2703, Paterson, 27, N. J. Material flow from the extruder is drawn through a built-in take-up arrangement onto a reeling station. Take-up, tension, and reel operations are independently synchronized to suit diversified demands. A duo indexed "Even-roll" assures compact pancake-like packages. Each machine is equipped with two reeling stations which can be used alternately.

Conveyer for extruded material—A 12-in. wide, endless, Neoprene-surfaced belt which can be removed and replaced in less than 5 min. has been announced by Modern Plastic Machinery Corp., 55 W. 42nd St., New York 18, N. Y. The front end



can be elevated to suit any standard extruder, and at any setting, the belt makes a straight line eliminating a bend in the extruded material. It is supplied as standard in 12- and 20-ft. lengths but may be made longer by special order. The drive, located at the rear end to eliminate vibration near the die, provides for belt speeds of 10 to 140 ft. per minute. Special stainless steel belt conveyors can also be furnished.

Electrical time cycle controller—Emmett Machine & Mfg., Inc., Akron 14, Ohio, has recently announced the Robotron, an electrical time cycle controller which, when properly hooked up with a molding press, makes the mold cycle an automatic operation. The unit, powered by a synchronous motor actuating lock



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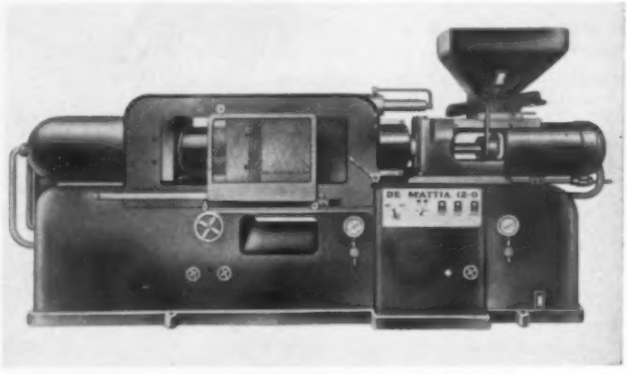
Machinery

ing and unlocking relays, and rotary switches, may be mounted directly at the press or in a remote location. The Robotron can be set to handle as many as six different press operations, such as low pressure to the ram, introduction of high pressure, breathing of the mold, etc. Provision may be made for safety controls which permit the press operator to stop the press in an emergency, independent of the automatic cycle. The device is set by depressing a series of buttons which control the various operations to be handled and the time interval for each.

Twelve ounce injection molding machine—A 12-oz. injection molding machine for polystyrene featuring an all-hydraulic clamp with a guaranteed 400-ton or better clamping pressure has been announced by DeMattia Machine & Tool Co., Chelsea Rd., Allwood, Clifton, N. J. To obtain this pressure, a 1000-lb. hydraulic system is used in conjunction with an intensifier which increases the pressure at a ratio of 5.2 to 1 on the closing ram only.



A snubbing action for both movements of the closing ram is provided in order to prevent die slamming and to control the ejection action of the molded piece from the mold. Specifications for this Model C machine include: Complete injection time, 3.3 sec.; complete mold closing time (minimum), 3.6 sec., 24-in. stroke; size of die plates, 18 by 25 in.; weight of machine, 8 1/2 tons; floor space required, 164 by 42 in.; and height, 72 inches.

Flush clippers—Single purpose flush gate trimmers for injection molders have been introduced by the Injection Molders Supply Co., Box 5508, Cleveland 1, Ohio. These cutters have removable blades to permit re-sharpening, and the pivot pin and holes are cyanided for long life. They are flat on the back to permit flush trimming.

Precision drill press—For the first time in 40 years, South Bend Lathe Works, 418 E. Madison St., South Bend 22, Ind., has departed from its exclusive manufacture of lathes to produce a 14-in. precision drill press. Both bench and floor models are now in production. Features of the press include a built-in light and a quick-acting belt tension release lever which returns the vertical mounted motor to its original position after each spindle speed change, thus maintaining the same belt tension for each of the four cone pulley steps. The spindle has a maximum travel of 4 in., with spindle speeds of 707, 1305, 2345, and 4322 r.p.m. The depth gage is graduated in 1/16 in. and has adjustable collars to control the feed depth and the length of the return stroke. A full tilt type table, with 10 by 10 in. top surface has slots for clamping fixtures or work.

Books and Booklets

Write directly to the publishers for these booklets. Unless otherwise specified, they will be mailed without charge to executives who request them on business stationery.

Matthews' Textile Fibers, Fifth Edition

Edited by Herbert R. Mauersberger

Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1947.

Price $12.50 **1133 pages**

It took a technical advisory and review board of 47 leading textile technologists and scientists, working under Editor Mauersberger to produce this most exactive treatise on all natural fibers, regenerated natural fibers, and synthetic fibers. Each fiber is dealt with separately, and its properties are carefully charted, as well as its reaction to organic and inorganic chemicals to be used in various processes of production, treatment, or cleaning.

Intended as a textbook for colleges and technical schools, this book should be an ideal reference work for all those dealing with fibers and fabrics of any kind.

The Welding of Plastic

by G. Haim and H. P. Zade

Published by Crosby Lockwood & Son, Ltd., 20 Tutor St., London, E.C. 4, England

Price 21/- **206 pages**

A survey of the theory and practice of welding as applied to thermoplastic materials is presented in this book, written and published in England. Welding of plastics is comparatively new and is recommended in those cases where a limited number of plastic items are desired and molding or casting would prove too expensive. The authors first discuss the chemistry, physics, and technology of weldable plastics and then explain the various ways of welding them—hot gas, heated tool, high frequency, and seam welding.

Chemical Engineering Catalog, 32nd Edition

Published by Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y.

Price outside U. S. A. $12.00 **1584 pages**

Condensed and standardized data on equipment, machinery, war materials, heavy and fine chemicals, and laboratory supplies used in the industries employing chemical processes of manufacture are covered in this latest catalog distributed free of charge to those in the chemical industry. A technical and scientific books section describes selected books on chemical and related subjects.

Plastics Manual

by H. R. Fleck

Published by the English Universities Press, Ltd., Saint Paul's House, Warwick Square, E.C. 4, England, for Temple Press Ltd., Bowling Green Lane, London E.C. 1, England

Price 15/- **155 pages**

A balance between the purely scientific work, the technological and the industrial applications of the various plastics is attempted here. The mechanical side of the industry, that is, the molding and production of molds, is also dealt with and the text contains numerous tables giving physical properties of commercial materials. Each type of plastic is discussed in a separate chapter with subdivisions under vinyls, for example, covering polyvinyl acetate, polyvinyl alcohol and its aldehyde derivatives, polyvinyl chloride, polyvinylidene chloride, and polyvinyl pyrrolidone. This breakdown enables the user of this book to find a desired subject easily.

Pacemakers of Progress

by Harold R. Quimby

Published by the Hide and Leather Publishing Co., Chicago 6, Ill.

Price $6.00 **368 pages**

Of interest to persons engaged in manufacturing, fitting, buying, selling, designing, or advertising shoes, this book traces the development of the shoe industry from 2000 B.C. to 1946 A.D. It provides easy reading whether one is interested in the industrial stages in the manufacture of shoes, their rôle in the evolution of fashions, the 16 basic shoe designs, fitting, lasts, heels, or foot structure. All of these topics are supplemented with attractive illustrations.

Metallizing—In the October *Metco News*, published by Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City 1, N. Y., the importance of metallizing as a maintenance tool is emphasized. Various articles show how heavy duty and hand metallizing guns can be used to apply metal to such equipment as press rams, steam dryer rolls, printing press cylinders, piston rods, crankshafts, plunger filler tanks, etc.

Company report—The Timken Roller Bearing Co. of Canton, Ohio, has compiled a series of 53 radio talks on the company's activities into a booklet entitled, "State of the company." Each of these talks covers some particular phase of the firm's operation and was originally broadcast over radio station WHBC in Canton.

A fusible plastic compound for casting—Norrell, Inc., 3047 Pershing Ave., Memphis, Tenn., has issued a booklet, "Norcell for flush molding," which details the use of Norcell, a fusible plastic compound, for casting displays, art objects, mannequins, toys, and novelties. This material can be used in most instances where plaster of Paris and papier-mache have been used. It melts down to a free flowing liquid which is cast without pressure in molds made of plaster, rubber, or metal.

Protective coatings—Chemical and physical properties, application instructions, and other data on protective coatings are discussed in a new 12-page catalog issued by the Amercoat Div., American Pipe and Construction Co., Box 3428, Terminal Annex, Los Angeles 54, Calif.

Plants and equipment—Bulletin 2204, a 24-page illustrated booklet entitled "Complete plants and equipment for the process industries," has been issued by the Blaw-Knox Co., Pittsburgh, Pa. Applications reviewed include resin and varnish production, organic synthesis, liquefied gas handling, electro-vapor heating

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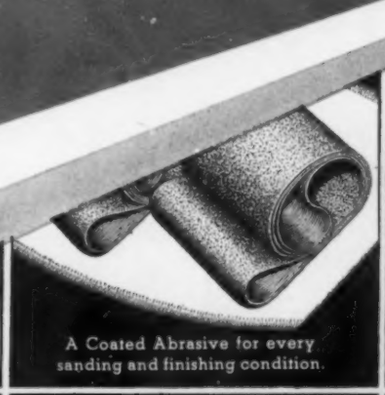

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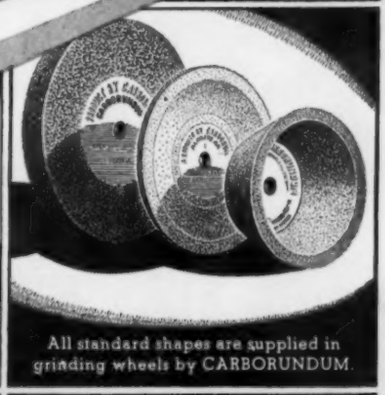

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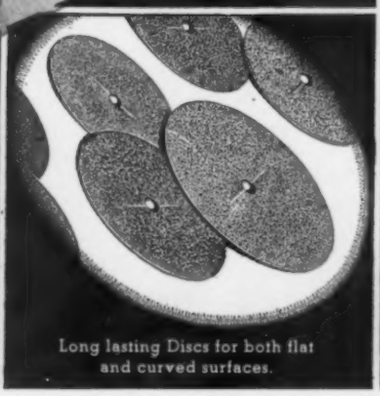

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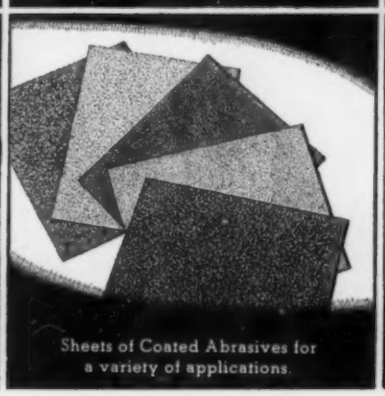

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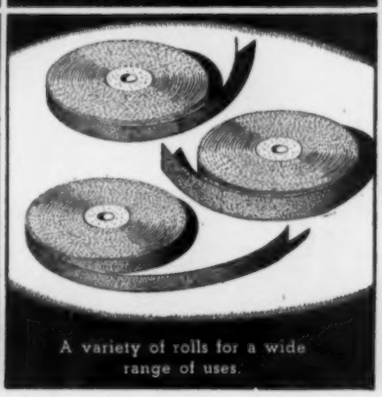

A variety of rolls for a wide range of uses.

systems, rubber reclaiming, molding resin production, fat splitting, oil and fat hydrogenation, gas dehydration, high pressure processing, and solvent recovery.

Line of stock molds—Rogan Brothers, 2500 W. Irving Park Blvd., Chicago 18, Ill., has announced a new catalog listing specifications on its line of stock molded plastic knobs, control handles, instrument knobs, etc. Data are also included on tool cost savings as well as the company's "deep relief" branding process.

Engineering service—"Making money by molding," a brochure on consulting engineering service for plastic molding, has been released by the Commonwealth Engineering Co. of Ohio, Dayton 3, Ohio.

Plastic-coated drill pipe—Development of a plastic-coated drill pipe for drilling oil wells in highly corrosive fields is described in a 22-page booklet issued by the Spang-Chalfant Div., National Supply Co., Grant Bldg., Pittsburgh, Pa. Results of actual field tests are presented, supplemented by pictures.

Activities in S.P.I.—The Society of the Plastics Industry, Inc., 295 Madison Ave., New York 17, N. Y., has published an attractive booklet describing the services and activities of Society of the Plastics Industry.

Plastic tubing—The Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio, is offering Bulletin 921 listing prices on the company's Saran tubing.

Fabricating services—Rogers Corp., Manchester, Conn., has issued a six-page, two-color folder describing the fabricating services which the company has available for fibrous materials, and listing the fibrous materials made by the company.

Classified directory—The Association of Consulting Chemists and Chemical Engineers, Inc., 50 E. 41st St., New York 17, N. Y., has just released the eleventh edition of its Classified Directory. Containing 120 pages, the 1947 edition is divided into three sections: Key sheet, scope sheets, and index listing members and their geographical locations. The key sheet section is preceded by an index, and a table of contents has been added in the back of the book for convenience.

Data on electrical insulating materials—"A.S.T.M. Standards on electrical insulating materials" for 1947, totaling 580 pages, has just been prepared by A.S.T.M. Committee D-9 on Electrical Insulating Materials. There are groups of specifications or tests on the following: insulating varnishes; paints and lacquers; plates, sheets, tubes, rods, and molded materials; mineral oils for electrical insulation; ceramic products; solid filling and treating compounds; insulating fabrics; insulating papers; mica products; electrical tests; rubber products; textile materials; miscellaneous, servicing units, conditioning, and pH value. This book may be obtained from A.S.T.M. Headquarters, 1916 Race St., Philadelphia 3, Pa., for $4 a copy.

Hydraulic cylinders—A new catalog on high pressure hydraulic cylinders has been announced by the Miller Motor Co., 4027-33 N. Kedzie Ave., Chicago 18, Ill. Complete mounting dimensions are given on double-acting and single-acting cylinders, cushioned and non-cushioned cylinders, single- and double-rod end cylinders.

Displays—Lustra-Cite Industries, Inc., 225 W. 28th St., New York 1, N. Y., has just issued an attractive illustrated booklet showing its line of displays for such items as jewelry, cosmetics, gloves, millinery, hosiery, ties, umbrellas, and shirts.

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The Plastiscope*

INTERPRETATIONS OF THE CURRENT NEWS

BY R. L. VAN BOSKIRK

Not enough naphthalene?

The plastics industry—the vinyl chloride branch in particular—is scanning 1947 figures and hopefully looking to 1948 for any sign of increased production in naphthalene. From naphthalene comes phthalic anhydride, a necessary raw material for the manufacture of a big portion of plasticizers. Dioctyl phthalate, all-purpose plasticizer, most commonly used with vinyl chloride and copolymers, is one of those directly affected.

There are other good plasticizers, but they are still in limited production compared to the demand. Consequently, when high-grade plasticizers are scarce, processors frequently use substitutes that are not entirely satisfactory, and vinyl materials reach the consumer that might better not have been made at all. Such materials often have a bad odor, show exudation at high temperature, crack at low temperature, and are otherwise inferior to properly plasticized goods.

Coal tar derived—Other plasticizers that suffer from a shortage of phthalic anhydride include dibutyl phthalate, used to a limited extent with a vinyl chloride and acrylics but primarily with polyvinyl butyral in making safety glass sheeting. Diethyl and dimethyl phthalate are other common phthalate plasticizers but are usually associated with cellulose acetate. By far the greatest use of phthalic anhydride is in the manufacture of alkyd resins for the paint, varnish, and lacquer industry. Thus, it is easy to understand why the synthetic resin and cellulosic plastic industry is concerned over the shortage of naphthalene—a coal tar derivative.

The naphthalene production figure for 1947 is not yet available but is estimated to be about 280,000,000 lb., an all-time high, and compares with 255,000,000 lb. in 1946. The experts are doubtful that there will be an increase of any great amount in 1948 for there is little reason to expect that more coal tar will be available for naphthalene recovery.

About 75% of the naphthalene production is dependent upon raw materials available from the coke oven operators of steel plants. Even though steel production increases in 1948, there is little hope that more coal tar will be available because steelmakers have found ways to use less coke per ton of steel. Further, they may also burn more tar as fuel in 1948 if the fuel oil shortage continues or if they find it more economical to burn coal tar rather than oil. Even the naphthalene production obtained from manufactured gas plants may decline since some communities are switching from manufactured to natural gas, from which no coal tar is obtained.

There are two kinds of naphthalene—crude and refined. Only the crude is used for phthalic anhydride. The refined, of course, brings a higher price, with the result that producers are inclined to look with favor on the refined market. As much as 35,000,000 lb. were used in moth-killing compounds in 1947, and other quantities for such things as dyestuffs brought the total to over 100,000,000 lb. of refined naphthalene. In addition, there were about 12,000,000 lb. used for soil fumigation.

More naphthalene needed—Crude naphthalene is needed at a rate of about $1^1/_5$ lb. for every lb. of phthalic anhydride. About 140,000,000 lb. of phthalic anhydride were manufactured in 1947, requiring nearly 170,000,000 lb. of naphthalene after making allowance for around 12,000,000 lb. of phthalic anhydride derived from petroleum. More phthalic anhydride could easily have been absorbed by both the paint and plastics industries. It is believed that there is sufficient capacity to absorb 200,000,000 lb. of naphthalene in present phthalic anhydride plants, but where the naphthalene will come from is not evident.

The petroleum industry may have the answer, but to date, production of phthalic from oil is limited. Oronite Chemical has announced that it will double its production of phthalic from petroleum which is currently estimated at about 8,000,000 lb. annually. American Cyanamid is reported to be using some ortho-xylene to supplement its naphthalene. But, as usual in most any chemical process, the ortho-xylene extracted from petroleum is produced only when other xylenes are also obtained, and markets must be found for them as well as for the ortho from which phthalic anhydride is processed.

Other plasticizers, such as resinous, solid, and phosphate types, will undoubtedly increase in quantity and use as time goes on, but they, too, are currently in short supply and often higher priced. Until such time as phthalates become more plentiful or more freely supplemented by other satisfactory types of plasticizers, the plastics industry, particularly the vinyl chloride family, is going to be faced with a supply problem. This is especially important in view of the steadily increasing production of vinyl chloride and copolymer resins which have jumped from nearly 125,000,000 lb. in 1946 to a possible 225,000,000 lb. capacity predicted for 1948.

Wartime surplus

For those who may be curious as to what happened to all the thermoplastic material allocated during the war, here is one answer. It is likely to bounce back to the discomfort of many people. On December 26, 1947, the War Assets Administration offered for sale 1,000,000 plastic soap boxes, with an original inventory value of $106,000. A few days later they offered a group of miscellaneous items, including cigarette cases, cigarette lighters, tobacco pouches, pipe cleaners, dice, and combs, among others, which were listed in inventory at $210,000.

G. E. plastics, 1947

The development of a heat-resistant molding compound, the manufacture of an all-plastics rowboat, and a record 650-lb. laminated plastic part for a synchrotron were listed in the General Electric Co.'s year-end review as part of their significant plastics developments for the year 1947. The report also calls attention to new applications of silicone oils, a new use for bouncing putty, and a new silicone adhesive. Resin and insulation advances included a solventless, cold-setting, casting resin; a varnished cloth combining insulating and adhesive properties, and improvements in Glyptal resins for enamels.

Manufacturing facilities of G. E. for plastic materials were expanded as follows: A new plant at Anaheim, Calif., for alkyd resins; one at Coshocton, Ohio, for laminated plastics; a plant for molded plastics at Decatur, Ill.; and another for silicones at Waterford, N. Y.

Packaging show

The American Management Association will hold its 17th Annual Packaging Exposition on April 26–30, 1948, in the Public Auditorium at Cleveland, Ohio. Approximately 200 exhibitors will utilize 100,000 sq. ft. to display developments in packaging, packing and shipping,

In Laminates Unity Requires Uniformity

To achieve an unvarying constant bond between fabrics and plastic materials requires a laminate duck with a high degree of uniformity.

Uniform in weave, strength, toughness, resiliency, flexibility and absorptive qualities, Mt. Vernon Extra fabrics assure you more stable laminates in every run. This quality in Mt. Vernon fabrics is the result of spinning and weaving to rigid standards of tolerances which are constantly checked by a broad system of laboratory controls. For fabrics that minimize processing problems and provide maximum uniform quality in laminates, specify Mt. Vernon Extra.

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machinery, equipment, materials, design, and services which are used in the manufacture and sale of virtually every product in the nation's commerce.

The annual three-day AMA Conference on Packaging, Packing, and Shipping will also be held in the Cleveland Auditorium, April 27–29, concurrently with the Exposition. More than a thousand packaging executives, engineers, and technical experts who are members of AMA's Packaging Div. will discuss the management aspects of materials, methods, procedures, and merchandising.

Pacific Coast S.P.I.

Plans for the 1948 Congress of the Pacific Coast Chapter of the Society of the Plastics Industry are being developed, with the site again to be the Biltmore Hotel at Santa Barbara, Calif., and the dates to be March 28, 29, and 30. General Conference Chairman Herb Pratt of American Cyanamid Co. and his committee are planning to provide time and space for informal technical discussion, with competent men to discuss details of materials and equipment with all comers on a forum basis.

Polystyrene price increase

Effective January 19, the Dow Chemical Co. raised the price on its polystyrene 1¢ per lb. on all colors and 2¢ per lb. on crystal. This increase in cost to the consumer came as the result of a sudden increase in the price of benzene.

Monsanto Chemical Co. also increased prices on Monsanto polystyrene at the same rates, effective on all shipments made January 21 and thereafter.

Telephones

Production by Western Electric Co. Inc., of telephone instruments alone in a single post-war year required, among other things, 4,000,000 lb. of molding powder and compounds; 11,000,000 lb. of steel; 1,359,000 lb. of aluminum. At present, no less than 132 standard varieties of 19 types of telephones are being manufactured by the company.

Cellulosics as dielectrics

Producers of cellulosics are currently pushing their products for use in the electrical industry. In a recent Hercules Powder Co. publication, there is an interesting presentation on the use of thermoplastics in electrical applications which states that molders who are well aware of cellulose acetate and other cellulosics' physical strength, flexibility, and chemical stability, are frequently unaware of cellulose acetate's electrical characteristics. The material has long been used in electrical applications for appliance housings and the like, but generally because of physical characteristics such as strength and flexibility rather than any particular electrical characteristics.

The cellulosics have the advantage of being good dielectrics with a low power factor which makes them good materials to use for insulators and other electrical purposes. They also have good volume resistivity, surface sensitivity, and arc resistance. Tables taken from the publication, "Technical Data on Plastics," 1945, issued by the Plastics Materials Manufacturer's Association, which compare the various electrical characteristics of all plastics, indicate that the cellulosics can be used to advantage for many electrical applications even though they may not possess the extremes in desirable values. This is particularly true where their electrical properties are evaluated in combination with their mechanical, chemical, and other properties.

Special cellulose acetate plastics have recently passed Underwriters Laboratories' flame and heat-resistance tests for thermoplastic enclosures for portable electric mixers, vacuum cleaner housings, an electric shaver, and fluorescent-light tombstone fixtures.

Fire-resistant panels

Development of fire-resistant paneling that protects human flesh within 1 in. of a 2200° source of heat has been announced by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. The new panels are made of specially treated Du Pont "Strux" cellular cellulose acetate plastic sandwiched between sheets of extremely thin (0.006 in.) carbon steel. Test panels are 1/4 in. thick, weigh less than a lb. per sq. ft., yet they are strong enough to support the weight of a large man.

Civil Aeronautics Authority specifications for airplane firewalls require materials to withstand applied heat of 2000° F. for 15 minutes. In official tests, according to Du Pont, the new steel and plastic panel withstood applied heat in excess of 2200° F. for more than 30 min. and, at the end of the test period, the hand could be held comfortably less than an inch from the panel on the side opposite from the fire.

The cellulose acetate core material is not fire-resistant, being classified as slow-burning. However, because of special treatment applied by the Skydyne Corp., Port Jervis, N. Y., developers of the paneling, the plastic on exposure to heat forms parchment-like layers which act as a heat barrier. The Skydyne Corp. will market the material under the name "Pyroply."

Safety program

A new safety program which has reduced plant accidents 80% has been announced by Tech-Art Plastics Co., Long Island City, N. Y. Lloyd Willis, personnel manager of the company, explains the novel plan as follows: Each of the 14 departments at Tech-Art is designated as a unit, and all personnel in a department having no accidents during the month are entitled to be represented at a Monthly Cash Safety Award Drawing. Any accident requiring the services of a doctor disqualifies that employee and his entire department from the drawing.

At the time of the drawing, all employees in qualified departments have their names and attendance records placed on drawing tickets. Should a name be drawn which shows absenteeism or lateness, that employee is automatically disqualified from winning the cash award. Names are drawn until an employee with a perfect attendance record is selected. This person receives the cash award.

Although this program has been in operation only a few months, it has proved unusually successful in the Tech-Art organization.

Improved rollers

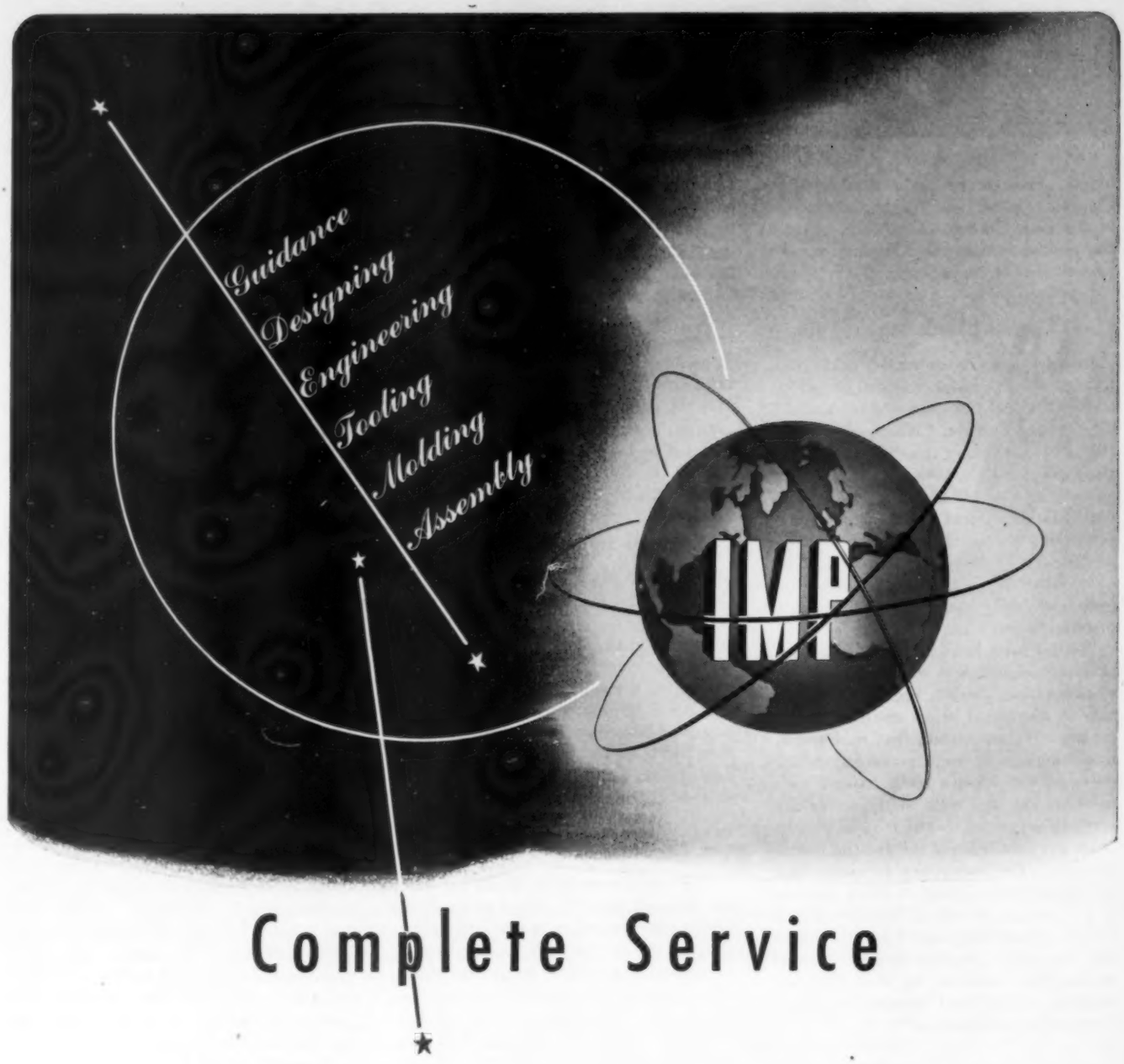
New plastic rollers with better wearing qualities than leather or natural or synthetic rubber rollers, are being manufactured by Resistoflex Corp., Belleville, N. J., for use in bag and envelope machinery. It is claimed that the plastic, compar, which is a compounded modified polyvinyl alcohol base material, is totally unaffected by fuels, oils, and other organic solvents, is light in weight, non-smearing, and has high tensile strength and resistance to wear and abrasion. The inherent non-static properties of compar make it especially valuable for roller applications.

Bag for blankets

A flexible dual-purpose plastic package for blankets has been designed and created by Clarvan Corp., Milwaukee, Wis., of vinyl chloride-acetate film under the trade name Plasticoid. The new crystal clear bag serves both as a transparent merchandising display package for the blankets, regular and electric, as well as a mothproof storage bag.

The new package protects the blankets during transit, storage, and while on the retail counter. It furnishes a compact, individual display and represents a gratis premium of utility value to the customer.

The development of special printing machinery utilizing certain electronic tech-



Complete Service

We offer a complete service that makes your plastics problems quite simple. We will help you in your original planning. We will help you design your plastic product and engineer it for most efficient production. Our tooling service frequently saves time and money and, of course, we work with all types of materials in both large and small dimensions. Our Injecto-Compression technique is hard to beat. We even complete the job for you with coloring and assembly, if you want it.

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Philadelphia office: 941 Drexel Bldg. Phone: Walnut 3544 • St. Louis office: 718 Lauderman Bldg. Phone: Garfield 2464

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niques, claimed to be exclusive with Clarvan, makes possible the imprinting of the vinyl chloride-acetate film so that the printed identification becomes a permanent part of the package.

Fights black market

In a letter to its customers calling attention to the black market situation, Calco Chemical Div., American Cyanamid Co., has this to say: "We do not believe that we shall at any time have a general shortage of dyes in 1948. Such shortages as there may be will be largely confined to particular dyes and special types, due principally to scarcities of special intermediates. *There need, therefore, be no alarm* that our domestic dye-consuming industries will lack sufficient coloring material to carry on.

"It has been brought to our attention that certain mills are selling dyes to the so-called black market, which dyes are resold at exorbitant prices and usually exported. We are certain that no responsible American dyestuff manufacturer is a party to supplying a black market with his products and such supplies, we are sorry to say, come mostly from mills who abuse the confidence of the dyestuff manufacturer. For consumers to order dyes for the purpose of resale to black markets is not only a breach of contract but a breach of good faith and if we can establish any such practice against anyone buying dyes from us, we shall take immediate action and promptly discontinue selling such parties."

Vinyon N for upholstery

Vinyon N, Carbide & Carbon's acrylonitrile—vinyl chloride copolymer yarn, is being made into bats for upholstery filling or cushions. It is said to have exceptionally good recovery or resilience, is vermin-proof, and mildewproof, and is unaffected by humidity. When covered with vinyl upholstery, it is unaffected by the plasticizer and will not support combustion. This same type of yarn batting also makes a good air filter and can be used for such things as sound and thermal insulation.

Molded polystyrene boxes

A packaging expert has called our attention to the significance of the recently announced Camembert cheese container (see page 172 of the December issue of MODERN PLASTICS) adopted by Kraft Foods Co., 500 Peshtigo Court, Chicago, Ill. He points out that this development of an injection molded box at a comparatively modest price has definite possibilities for future expansion and wide adaptation for uses in the packaging industry. It is an injection molded semi-circular telescoping box with a wall thickness of approximately 0.045 inch.

Although the box will be strongly promoted for its re-use value, our expert thinks that in lots of, say, 200,000, it may at least partially compete in price with low-cost boxes made of wood and paper. Claimed to be the first injection molded box of its type, the job was done by General American Transportation Co.

Vinyl-net sandwich

Vinyl Products, Ltd., Butter Hill, Carshalton, Surrey, Eng., a vinyl processing company, has completed successful experiments with a transparent polished vinyl sheet consisting of a sandwich made by placing a piece of cotton net between two layers of clear vinyl. The sandwich is pressed between polished metal sheets at from 200 to 300-lb. pressure at a temperature of from 140 to 150° C. The finished sheet is very desirable for the shoe trade.

Buna-N for plastics

Ultimately some 40 to 60 million lb. of the Buna-N (nitrile) types of synthetic rubber are expected to be used annually as alloying ingredients with the vinyl resins, according to an article on synthetic rubbers in New Jersey Standard's publication, *The Lamp*. The article pointed out that the 1948 production of polyvinyl chloride resin will have to be alloyed with from 100 to 150 million lb. of other substances if the goal of 350 million lb. of vinyl chloride resin is to be reached.

During the years 1942 to 1946 inclusive, production of all nitrile rubbers averaged 24 million lb. a year, according to *The Lamp*, but annual production is expected eventually to reach 140 million pounds.

Synthetic cordage

Cordage manufacturers in the United States are becoming increasingly interested in synthetics due to the shortage of hard fibers, according to Dr. E. B. Johnson, director of Research Laboratories, Columbian Rope Co., Auburn, N. Y., who notes that rayon development at the end of the 19th century produced a weak fiber which found few commercial uses. Improvements followed swiftly, and today it is a strong inexpensive fiber with wide applications.

Nylon is already reshaping the future of the cordage and textile industries, Dr. Johnson goes on to say, and chemical experiments with polyvinyl resins have resulted in two types of thermoplastic fibers, Vinyon and Saran. He states, however, that no answer is as yet at hand to indicate how these two materials may ultimately be used in cordage.

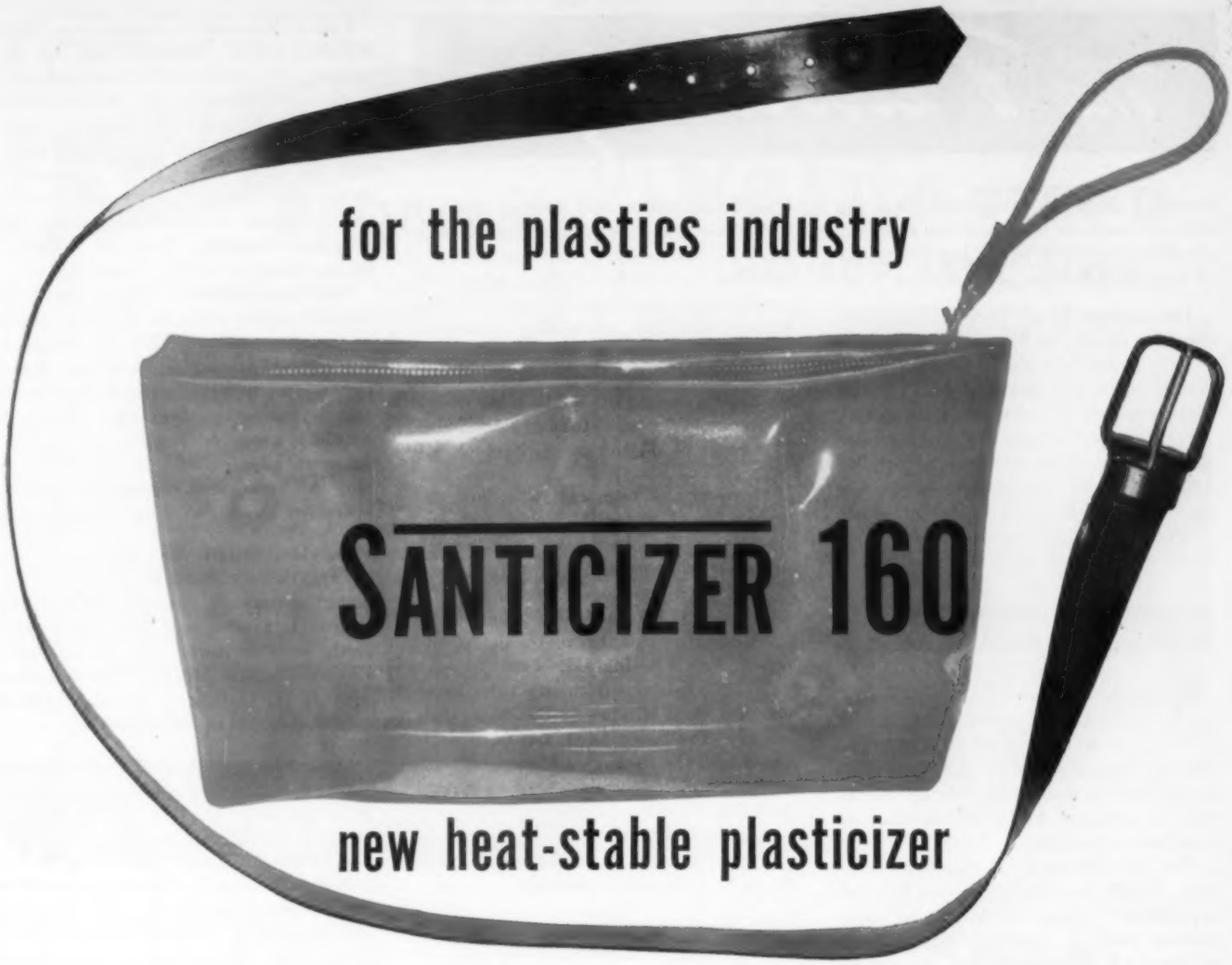
RAW MATERIALS

NUSO 250, a high viscosity petroleum plasticizer, is being offered by the Standard Oil Co., of New Jersey, 15 W. 51st St., New York, N. Y. Although the company makes no particular claims for its use as a plasticizer with plastics, it points out that the material has not been thoroughly tested in such experiments and suggests that the plastics industry operators may wish to try it out. The company says that whereas many of the petroleum oils are limited when used as plasticizers because of poor compatibility with resins, NUSO 250 is, on the contrary, compatible with many resins. It has a specific gravity of 0.989 and weighs 8.24 lb. to the gallon. The color is dark and clear.

Perhaps the most notable characteristic of NUSO 250 is the extreme change in viscosity between the temperatures of 100 and 210° F. While this would be extremely objectionable in lubrication, it is highly desirable in many plasticizer uses where the manufacturer wishes it to become as fluid as possible when heated. This permits ready and easy mixing with other ingredients and minimum power consumption by the mixer. If the product is used with a solid, rapid and complete penetration is obtained when the plasticizer is applied at an elevated temperature. Further, the product will have little tendency to migrate within the composition after it is prepared.

However, NUSO 250 does not behave as well as many chemical plasticizers of lower viscosity at low temperatures and cannot be considered to impart freeze resistance to rubber, for example, at much below —35° F. It has so far been successfully tested in floor tile; caulking and potting compounds; waterproofing canvas, tarpaulins, etc.; paper lamination; and tarred rope, twine, and oakum.

EDF Crystals (Tech.) have been announced by the Rhodes Industrial Corp., East Hampton, N. Y. These crystals have been found to be extremely reactive when used in phenolic-type thermosetting resins in place of hexa as a setting agent. New types of resins are produced when the condensation is effected between EDF and the phenol directly. EDF has also indicated value in accelerating the vulcanization of rubber, as a "vulcanizing" agent in polyvinyl resin compounds, as a cross-linking agent in protein fiber chemistry, and generally as a new chemical inter-



for the plastics industry

SANTICIZER 160

new heat-stable plasticizer

Of special interest to the entire plastics industry is this new development of Monsanto Chemical Company — Santicizer 160... It is a heat-stable plasticizer that offers many advantages in production operations, as well as important product improvements.

Since it is compatible with a large variety of more generally used resins, including the important vinyl polymers and co-polymers, nitrocellulose and ethyl cellulose — Santicizer 160 can be applied to a broad range of products to impart varying degrees of hardness and flexibility.

One of the chief advantages of Santicizer 160 is that it permits plastics manufacturers to increase their production rate. For instance, its use enables the extrusion of plastic products *faster* at temperatures normally employed... or, existing production rates can be maintained *at lower temperatures.*

In addition, Santicizer 160 is characterized by low burning rate, good low-temperature flexibility, oil resistance, heat stability, light stability and abrasion resistance. For complete technical information write to MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, St. Louis 4, Missouri, or use the convenient coupon below.

Santicizer: Reg. U. S. Pat. Off.

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mediate. EDF crystals are soluble in the same solvents as hexa and the solutions provide an odorless, highly reactive source of methylene bridges.

Lactoprene EV, an acrylic elastomer, has been developed by the Dept. of Agriculture's Eastern Regional Research Laboratory and is now being made on a pilot plant scale at Government laboratories. Its production is simpler than that of butadiene rubber. For samples and detailed information on the compounding and properties of the acrylic rubber, write Eastern Regional Research Laboratory, Chestnut Hill Station, Philadelphia 18, Pa.

COMPANIES

Eastman Kodak Co., Rochester, N. Y., has opened a new plastics laboratory said to be the first of its kind in the camera industry. The laboratory is located in the company's Camera Works and is equipped for a broad range of experimental studies.

The new laboratory is expected to enable Kodak to solve more quickly and scientifically many research and engineering problems associated with the use of plastics in photographic equipment.

The laboratory is under the general su ervision of Garson Meyer, chief chemist at the Camera Works, and Gerard Delaire is engineer-in-charge.

Luminescent Plastics Corp., 201 N. Wells St., Chicago 6, Ill., has been newly incorporated for the purpose of turning out luminescent plastics in granule form under the trade name "Paulite," for use in injection molding equipment. It is stated that this material has a maximum initial glow immediately after exposure and an after glow of 12 or more hours.

Celluplastic Corp., Newark, N. J., has appointed Dygert & Stone, Inc., 36 St. Paul St., Rochester N. Y., to represent the company in Upper New York State, another step in its rapidly expanding sales representation.

Carbide and Carbon Chemicals Corp. has opened a new sales office at 1527 Experson Bldg., Houston, Texas. Paul J. Doyle, Jr., formerly in the corporation's St. Louis office, is in charge.

Plax Corp., Hartford Conn., is now producing its polyethylene layflat tubing in gusseted form. The new type tubing has the same advantages as the plain flat tubing in that it is seamless, flexible, and tough. Similarly, it may be cold-stretched several hundred percent and is non-toxic, odorless, moistureproof, and chemically inert. These latter advantages have resulted in the wide use of Plax's polyethylene tubing in the food and chemical fields. According to Plax, availability of the gusseted form makes the tubing more readily adaptable to packaging lines, since a separate gusseting operation is no longer necessary. The new tubing is available in continuous lengths and various colors.

Monsanto Chemical Co. has announced that James P. Skehan will succeed Edwin L. Hobson as assistant branch manager for Monsanto's New York plastics office. As previously announced, Mr. Hobson has become sales manager of thermoplastic molding materials in the home office at Springfield, Mass.

Mr. Skehan was formerly sales manager for sheet plastics in the New York office. The Sheet Dept. has been combined with the Packaging Materials Dept. under the direction of Richard C. Evans. Assisting Mr. Evans as assistant sales managers will be James Brunner, in charge of packaging materials sales, and Oscar E. Hollemans, sheet sales.

Sterling Plastics Co. recently completed extensive additions to its plant at 1140 Commerce Ave., Union, N. J. A new 200-ft. long "daylight" wing provides efficient facilities for materials storage, an enlarged injection press department, and increased layout areas for finishing operations. According to company president George Staab, Sterling is now a $2^3/_4$ acre plastics plant devoted to production in quantity. They do both custom and proprietary molding.

American Decalcomania Co., 636 11th Ave., New York, N. Y., has developed a new decal which provides especially good adhesion to most plastic surfaces. Application requires use of water only.

Sylvania Div. of American Viscose Corp. has moved its offices to the 19th floor of the Empire State Bldg., 350 Fifth Ave., New York, N. Y.

Reichhold Chemicals, Inc., 601 Woodward Heights Blvd., Detroit, Mich., has announced that Fred Grosius, treasurer of the company, and T. K. Haven, vice-president in charge of finance, have been elected to membership on the corporation's directorate. H. W. Mason, Jr., and E. A. Terray have been elected to vice-presidencies, the former in charge of purchases and the latter exports.

Fabric Research Laboratories, Inc., 665 Boylston St., Boston, Mass., has announced the completion of a new and automatic instrument for the determination of the elastic properties of fibers, yarns, fabric, plastics, paper, and similar materials by sonic means. The new instrument, the "Pulse Propagation Meter," was developed in collaboration with the Magnetic Amplifier Corp. of Waltham, Mass., which produces and sells it.

Wide application has been made of the new instrument in studies of such problems as the effects of molecular orientation on the elastic properties of plastic materials. The meter is entirely automatic, and determinations are made in fifty millionths of a second. Findings are recorded automatically, according to the company, and the instrument repeats its cycle of operation about 200 times each second.

Barrier, Pribble and Co., P. O. Box 55, Fort Wayne, Ind., is a consulting engineering company recently organized by Wayne I. Pribble and Alvis L. Barrier. Both were formerly with the General Electric Co., and Mr. Pribble is co-author with J. H. DuBois of *Plastics Molding Engineering*, published in 1946.

Pyro Plastics Corp. has removed its entire facilities, including general offices, from 526 North Ave., East, Westfield, N. J., to 690 Chestnut St., Union, N. J.

Rohm & Haas Co. has announced that its associate firm, Charles Lennig & Co., Inc., has been dissolved as a separate corporation, the business to be continued without change under the name Lennig Div. of the Rohm & Haas Co.

As an associate firm, the Lennig Co. has manufactured heavy chemicals, which will now continue to be available from the Lennig Div. of Rohm & Haas. Policies and personnel will remain the same.

Ideal Novelty & Toy Co. has acquired a controlling interest in the Lindstrom Corp., Bridgeport, Conn., leading producers of mechanized toys and toy motors. The transaction is said to have involved physical assets valued at some $1,000,000. Ideal's estimated 1947 sales volume was approximately $15,000,000, according to B. F. Michtom, vice-president and chairman of the board. Mr. Michtom estimated that total sales of the toy industry was in the neighborhood of $250,000,000 at retail. He also declared that "the present trend in the industry presages a wide expansion of the market for mechanized, stuffed, and plastic toys, in which we have specialized."

Both Lindstrom and Ideal will retain their respective identities with no changes in policy or personnel. Sales, engineering, and distribution will, however, be more closely integrated, according to Michtom, with each company's facilities being available to the other for development of new items. *(Turn to next page)*

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Engineering Associates, Inc., St. Charles, Ill., has been purchased by and will operate under the direction of Foster W. Berry, president, R. A. M. Palese, vice-president, and John J. Jaeger, secretary-treasurer. This firm is composed of a group of chemists, engineers, designers, and technologists engaged in industrial research and product development on plastics, molded pulp, wood, fiber, and related materials.

Bloomfield Molding Corp. is announced as successor to the company known as Plastic Enterprises, Inc., at 129 Bloomfield Ave., Bloomfield, N. J. The address will remain the same.

PERSONAL

E. Bowman Stratton, formerly in the Washington office of the Plaskon Div., Libbey-Owens-Ford Glass Co., and later with Pennsylvania Coal Products Corp., has joined the Relief Map Section, Army Map Service, Dept. of the Army, as development specialist.

Ralph (Bud) Browning has resigned his position with Plastic Manufacturers, Inc., of Stamford, Conn. Mr. Browning has made no announcement of his plans for the future.

Milo R. Gerow has been appointed product manager of the Plastics Div. of Reynolds Metal Co. and will be in charge of plastic film sales, development, and production. His headquarters are the New York office of Reynolds Metal at 19 E. 47th St. Mr. Gerow has been president and a director of the Newark Section of the Society of Plastics Engineers for the past year and was formerly New York technical sales representative for the Cellulose Products Dept. of Hercules Powder Co.

C. N. Sprankle, Sandee Mfg. Co., Chicago, Ill., was named chairman of the Midwest chapter of the Society of the Plastics Industry for 1948. At the same time, H. W. DeVore, Plaskon Div., Libbey-Owens-Ford Glass Co., was elected vice-chairman, and Val Wright, Modern Plastics, was named secretary-treasurer.

Dr. C. W. Selheimer, U. S. Rubber Co., was elected chairman of the Detroit Rubber and Plastics Group, Inc., at a joint meeting with the Society of Plastics Engineers in Detroit, Mich., in December. W. F. Davies of the Kaiser Frazer Corp. was elected vice-chairman.

A. M. Stover, Chemicals Div. of the Glenn L. Martin Co., Baltimore, Md., was awarded second prize in the color division of the nation-wide Photography in Science Competition held by the American Association for the Advancement of Science. Mr. Stover's entry consisted of a series of eight color prints entitled "Eight progressive shots taken using polarized light to show stresses developed in a plastic film being subjected to a trapezoid tear test."

The exposures were made in connection with the activities of a committee of the Society of the Plastics Industry, of which Mr. Stover is a member. The committee is interested in the standardization of tear tests to be used by plastics manufacturers for evaluating the tear resistance of plastic film. The pictures showed conclusively that the trapezoid tear test is not suitable for determining the tear strength of thin plastic film.

Roy L. Peat, for 22 years with Plastic & Die Cast Products Corp., has resigned his position as president and general manager of that organization, effective immediately. Mr. Peat is a member of Plastic Pioneers and past chairman of the Pacific Coast section of the S.P.I.

V. R. Childress has been appointed manager of Industrial Plastics Sales of O'Sullivan Rubber Corp., Winchester, Va. Mr. Childress was formerly with the Geon polyvinyl materials sales dept. of B. F. Goodrich Chemical Co.

Jack Lein, formerly of Universal Plastics, has joined the New York sales staff of Celluplastic Corp., Newark, N. J.

L. E. Cheyney, Battelle Memorial Inst., Columbus, Ohio, was elected president of the Central Ohio Section of the Society of Plastics Engineers at their meeting in Lancaster, Ohio, in December. Also elected were M. W. Burkhart, Plastics Design and Sales Co., Newark, Ohio, vice-president; C. W. Cooper, Battelle Memorial Inst., Columbus, secretary; and R. D. Beck, Continental Can Co., Cambridge, Ohio, treasurer.

Robert J. Newell and **Charles F. Loper** have been appointed assistant sales managers of the Consumer Goods and Industrial Plastics Divisions, respectively, of Clarvan Corp., Milwaukee, Wis.

Cantwell Clark, formerly manager of the Du Pont Co.'s nylon plant at Martinsville, Va., has been made nylon planning manager at Wilmington, Del. W. Donald Harford, former manufacturing superintendent at the Rayon Div. plant, Old Hickory, Tenn., is now manager at Martinsville.

Le Verne Verzier has joined Lupomatic Industries, Inc., as director of development. Mr. Verzier's chief function will be to develop the science of tumbling.

Richard N. Campen, formerly technical director of the Floyd A. Holes Co. in Bedford, Ohio, has joined the New Products Div., Research and Development Dept., Mead Corp., Chillicothe, Ohio.

Henry W. DeVore, district manager of molding compounds for Plaskon in the Chicago area for three years, has been appointed sales manager of molding materials for Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio. Mr. DeVore has been with Plaskon since 1932.

John R. Hoover, vice-president of B. F. Goodrich Chemical Co., Cleveland, Ohio, and Dr. D. S. Frederick, vice-president of Rohm & Haas Co., Philadelphia, Pa., were re-elected president and vice-president respectively, by the Plastic Materials Manufacturers Assn., Inc., at its annual meeting in January.

F. H. Carman was elected secretary-general manager, and John E. Walker, treasurer of the association, with headquarters in Washington, D. C.

Erwin G. Somogyi has been appointed to the newly created position of assistant director of research of the Plastics Div., Monsanto Chemical Co. in charge of process development.

Deceased

Brice S. Hull, Pittsburgh branch manager of Solvay Sales Div., Allied Chemical & Dye Corp., January 2.

MEETINGS

March 9–10—Commercial Chemical Development Assn. annual meeting. Roosevelt Hotel, New York, N. Y.

March 15–19—American Society of Tool Engineers' Sixth Industrial Exposition. To be held in the Public Auditorium, Cleveland, Ohio, in conjunction with the Sixteenth Annual Convention of ASTE.

May 20–21—Annual meeting of the Society of the Plastics Industry at the Hotel Ambassador, Atlantic City, N. J. This year the Conference is being held separately from the National Plastic Exposition to enable members of the industry to concentrate entirely upon the conference meetings.

Sept. 27–Oct. 1.—Third National Plastics Exposition, Grand Central Palace, New York, N. Y.

For molded acrylic parts of exceptional heat stability—

It pays to use PLEXIGLAS "V." This newest member of the Rohm & Haas family of acrylic molding powders has the extremely high A.S.T.M. heat distortion temperature of 197.6°F (92°C)—shrinkage after 48 hours at 212°F (100°C) is less than 10 mils per inch.

With these features, which assure extraordinary stability under high-temperature service conditions, PLEXIGLAS "V" combines clarity and brilliance surpassing any previous molding powder to bear this famous name. In addition, PLEXIGLAS "V" flows at notably low temperatures for a heat-resistant material—resulting in molding speed and economy.

Of course, PLEXIGLAS "V" retains the familiar features that have made other Rohm & Haas members of this acrylic resin group a leading choice with the automotive industry—high impact strength, dimensional stability, resistance to weathering and chemicals.

Progressive molders will find it worthwhile to . . .

. . . INVESTIGATE *Plexiglas V*

Mercury steering wheel medallion molded by Erie Resistor Corp., Erie, Pa.; Buick steering wheel medallion by Kent Plastics Corp., Evansville, Ind.; Frazer steering wheel medallion by Kent Plastics Corp. and Bay Manufacturing Division, Electric Auto-Lite Co., Bay City, Mich.; Plymouth speedometer dial and Chrysler stop light lens by Bay Manufacturing Division, Electric Auto-Lite Co.

Only Rohm & Haas makes Plexiglas Acrylic Plastic Sheets and Molding Powders

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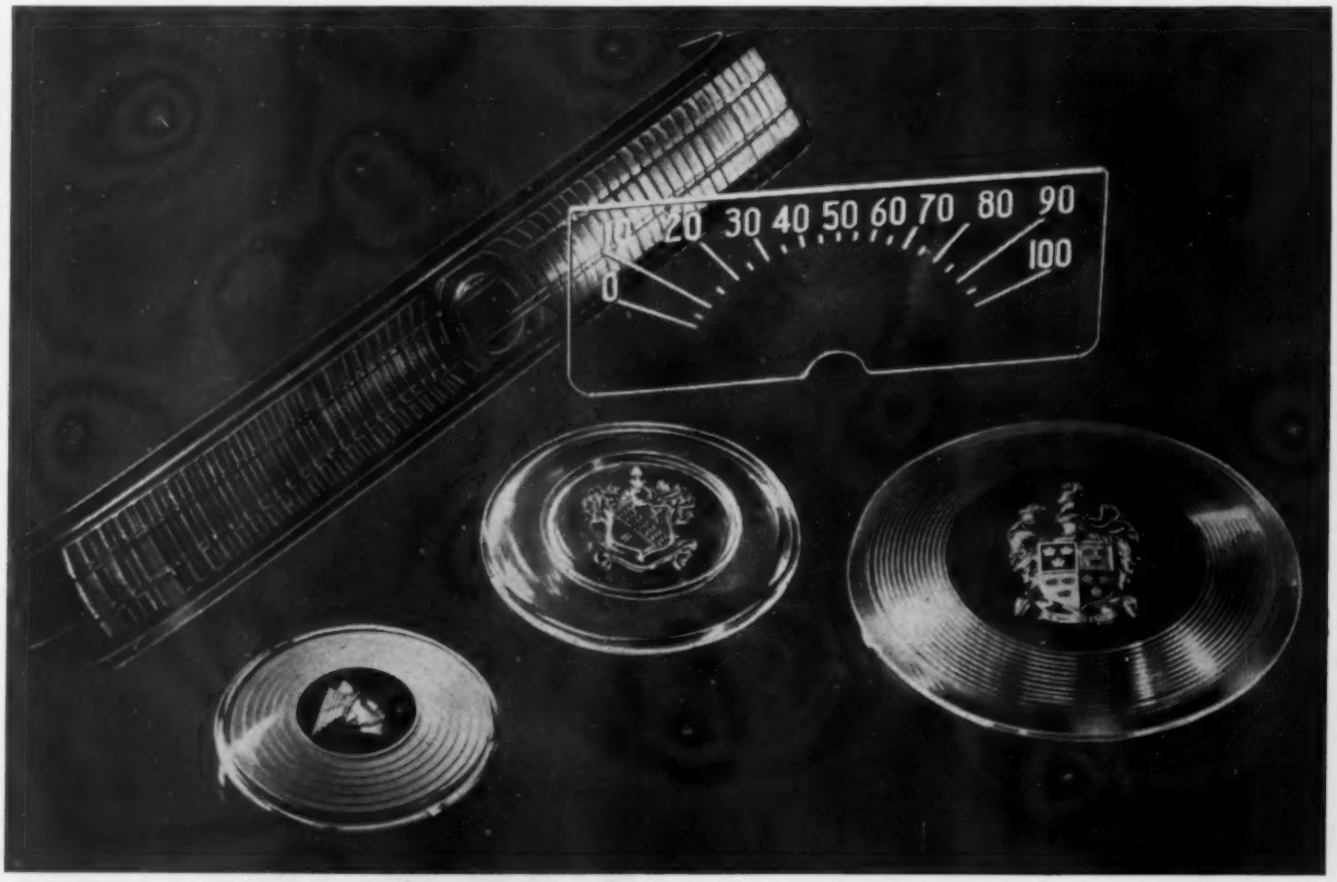

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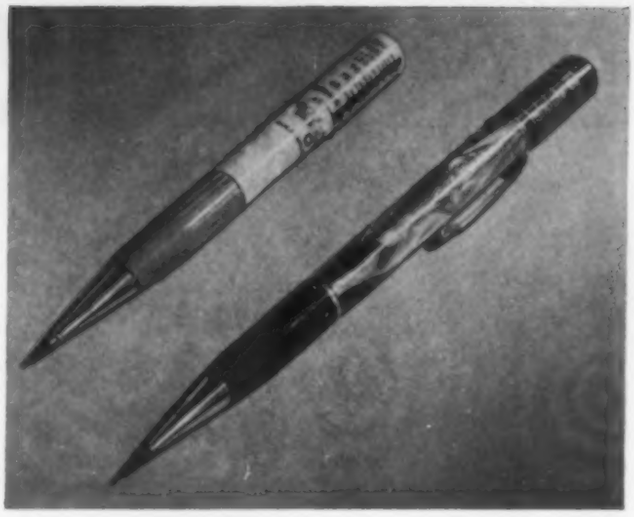
Manufacturers of Chemicals including Plastics • Synthetic Insecticides • Fungicides • Enzymes • Detergents
Germicides • Chemicals for the Leather, Textile, Ceramic, Rubber, Paper, Petroleum and other Industries

Regal ring boxes

A fitting container for the rings of Coronation Diamonds, Inc., New York City, is this Crown Case injection molded of rose magenta polystyrene by Celluplastic Corp., of Newark, N. J. The container is turned out in three parts using a 6-cavity die. The gold colored metal on finished box enhances crown effect

Urea-formaldehyde, compression molded by the Electric City Box Co., Buffalo, N. Y., for J. R. Wood & Son, New York City, is used in this modern ring box. Designed by Egmont Arens, the Plaskon box will hold a one, two, or three ring set by changing pad. Space is provided under the pad for a written guarantee and a small center leg under the box enables a dealer to display the box at an angle



Distances can be gaged on the pencil at left. Top of pencil at right is perpetual calendar

Pencils

with yardage meter

or perpetual calendar

GOLFERS who blame high scores on wrong clubs during locker room post-mortems have another prop knocked from their alibis by a handy new mechanical pencil which also measures distances from 45 to 200 yards. By sighting the green across a scale on the pencil, it is possible to determine the distance quickly and hence to select the right club for the shot.

A companion piece is a pencil with a perpetual calendar near one end. A busy person can keep track of the days by locking the correct calendar in place the first day of each month.

Cellulose nitrate parts

Both pencils make use of cellulose nitrate and are manufactured by Ritepoint Co., St. Louis, Mo. Nixon C/N, Pyralin, Nitron, and Celluloid are used interchangeably for the body of the pencils. The mechanism itself, the clip, intersections, band bushings, band, and rings are of metal. The four-part body of the calendar pencil and the three-part body of the yardage meter pencil are formed by the company on specially designed dies.

Complete instruction sheets accompany each pencil. Both types of pencil are distributed through regular retail outlets or may, upon special order, be printed with a personalized advertising message or with an individual name.

Where PERBUNAN helps 4,800 horses breathe!

THE FLEXIBLE COUPLING shown above is a mighty important item on the 4800 horsepower Pratt & Whitney engines used in the new Convair-Liner commercial transports.

It connects the air duct to the carburetor...carries in the tremendous feed of air needed for proper gasoline mixture. It has to have hot-temperature dependability...high resistance to oil and high octane gasoline...and lend itself to precise fabrication.

PERBUNAN NITRILE RUBBER was selected for this vital coupling after engineers of Consolidated Vultee and the technicians of Los Angeles Standard Rubber, Inc. ran many exhaustive tests and found Perbunan best suited for the job.

For rubber that resists oil, heat, abrasion and water...holds delicate colors...and stays flexible at low temperatures... write our nearest office.

PERBUNAN
REG. U. S. PAT. OFF.

THE RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

ENJAY COMPANY, INC. 15 West 51st Street, New York 19, N. Y.; First National Tower, 106 South Main Street, Akron 8, Ohio; 221 North La Salle St., Chicago 1, Illinois; 378 Stuart Street, Boston 17, Massachusetts. West Coast Representatives: H. M. Royal Inc., 4814 Loma Vista Avenue, Los Angeles 11, California. Warehouse stocks in Elizabeth, New Jersey; Los Angeles, California; Chicago, Illinois; Akron, Ohio; and Baton Rouge, Louisiana.

Picture light

Combines decorative wall treatment with source of illumination

A DECORATIVE picture for the bedroom wall and a source of carefully focused, glareless light for reading in bed, the Decoralite hangs on the wall like a picture, plugs in to any outlet like a lamp. This new picture light, manufactured by Lightolier, Inc., Chicago, Ill., does not replace any existing lighting device; it inaugurates an entirely new type of decorative treatment.

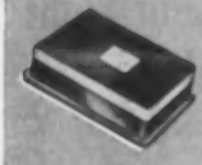
Decoralite is actually a panel of Plexiglas or glass decorated with a hand-carved or screen-printed design and framed in a shadow-box measuring 18½ by 16 inches. The designs are in gradations of frosted white or clear colors. Incandescent lumiline tubes at the top and bottom of the frame cast a soft light directly downward for reading in bed, and diffuse light upward from the top of the frame to illuminate the rest of the room. The picture itself takes on a glowing, three-dimensional quality.

A wide choice of designs suitable for either period or modern rooms is available. Frames are of metal, with permanent enamel finish in three colors—off-white, Chinese red, and Chinese black.

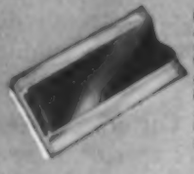
MECHANICAL strength can be added to molded parts without burdensome weight. Fastening inserts, or structural reinforcements, are light, strong; available in many cases from stock.

ELECTRICAL conductivity of aluminum is high. Perhaps you're thinking about a molded plastic electrical part where aluminum inserts provide the necessary conductivity. They're strong, too!

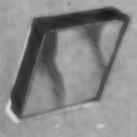
THERMAL properties of aluminum are excellent. Let's say you're designing a plastic product which must be air-cooled. You might use aluminum discs, molded in, as above.



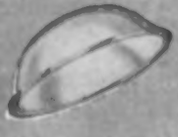
DECORATIVE values of aluminum are a long story in themselves. Use it plain, or with frosty or mirrorlike Alumilite or colored finish (patented process). Remember, it's light!



EXTRUSIONS of plastic combined with extrusions of aluminum? Why not? One supplements the other, in beauty and strength. Alcoa Aluminum is available in many stock shapes.



LAMINATED plastics can be faced with aluminum sheet for a new idea in modern materials. Or, why not inset Alcoa Aluminum decorations in your dark laminates? Attractive!



FORMED plastic sheets team up well with Alcoa Aluminum, as in this navigator's dome. The whole assembly is light, strong, easy to mount. Is there a household idea here?

CHEMICAL properties of aluminum supplement those you like to stress in plastics. Can it help you in products for textile, process, petroleum, pharmaceutical, food industries?

TEAMING UP FOR Economy

Grille made by Electric Auto-Lite Co., Bay City Division, Bay City, Michigan

An example of Aluminum-Plastic Teamwork that paid off

This auto radio grille of aluminum and plastic paid off handsomely by reducing production costs. Chrome-plated steel louvers were replaced with parts formed from Alcoa mill-finished, coiled sheet aluminum. Three times as many louvers were produced per pound of metal and the expense of chrome plating was eliminated.

Aluminum is the metal "Friendly to Plastics". Nature gave it an expansion coefficient very close to that of the commonly used molding materials. This characteristic makes aluminum an ideal metal for use in injection molded plastic parts and aluminum and plastic assemblies. For low cost in high production—for Alcoa Aluminum's handsome appearance, light weight and valuable chemical and electrical properties—you, too, will find that *Aluminum Plastic Teamwork Pays Off!* ALUMINUM COMPANY OF AMERICA, 2175 Gulf Building, Pittsburgh 19, Pennsylvania. Sales offices in principal cities.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

IN EVERY COMMERCIAL FORM

S.P.I. conference

(*Continued from page 86*) be made fire-resisting although melamine resins are better in this respect than either the phenolics or the polyesters. The specific gravities of each are very close. Both have good chemical resistance and very low organic liquid absorption rates.

The water absorption values for both are low. Only in the paper base laminates do the phenolics show a slight advantage. This is possibly due to the smaller molecule size of the phenolic resins and hence better impregnation of the paper fibers, but research now in progress has shown that the water resistance of contact pressure paper base laminates can be made as good as the phenolics.

CONTINUOUS LAMINATING

by Cecil W. Armstrong, consulting engineer, Burket, Ind.

The continuous laminating processes essentially provide for continuous combining of two or more resin-wetted sheets of suitable materials between separable covers and for continuous heat-curing of the laminated stock at atmospheric pressure. Raw materials include a variety of commercially available resins, catalysts, filler materials, and cover sheets. Any suitable filler may be combined with any other or combination of filler materials, the selection depending upon the desired physical properties of the end product, economic considerations, and availability of the desired materials.

Combining of the filler materials to form the laminated stock is usually accomplished with the assistance of one or more pairs of pressure rolls. Nominal thickness of the laminate is determined by the sum of the thicknesses of the filler materials. The wet laminate is usually combined with one or more cover sheets at the final set of pressure rolls; edges of these sheets must be gripped continuously and uniformly to provide wrinkle-free and wave-free surfaces throughout the length of the curing oven.

A circulating oven of two or more temperature-controlled zones is considered necessary for the heat-curing of continuous laminates. Typical temperatures for an oven of three equal length heating zones are 180, 210, and 260° F. for the first, second, and third zones, respectively. Whereas early resins required several hours to effect a complete cure, resins are now available which give complete cures in five minutes or less for thicknesses up to $^1/_{16}$ inch.

If this relatively new field of continuous laminating of polyester resin materials is to continue to exist, it is imperative that more time, effort, and money be spent in establishing and carrying forward test procedures and quality control methods than in the past. Quality control work should begin with selection of raw materials and continue along with the process to final inspection of the product.

DESIGN-PRINTED PAPERS FOR THE POLYESTER RESIN LAMINATING INDUSTRY

by George R. Wallace III, Decotone Products Div., Fitchburg Paper Co.

In the early stages of this development, it was assumed by some of the laminators themselves that any base paper, any ink, and any method of printing would produce satisfactory results. Experience has proved, however, that this was far from the case. Actually the problems facing the design-printers of papers for polyester laminates became extremely complex. The printing itself proved to be the major bottleneck.

One of the toughest problems in this development has been the production of inks which will not fade or bleed when used in conjunction with polyester resins—especially those containing styrene. Some dry colors fade when the product is exposed to light in laminated form, although the untreated papers are resistant to fading. However, ink manufacturers have been able

to produce most colors desired. The requirement for light-fastness is met by using such colors as cadmium yellow, cadmium red, cyan blue, and oxide brown. To get around bleeding of inks after polyester lamination, ink manufacturers have developed inks containing resins not soluble in styrene.

There are several things which can be done to avoid the flat, two-dimensional appearance which will result if conventional single-color printing is used. It is possible to superimpose two or more designs on the same sheet, or to obtain a real two-dimensional effect by printing one component of the design on the underside of an overlay sheet. Ink manufacturers are working on the development of inks which will permit three-color process work. Finally, instead of limiting ourselves to continuous designs, it is possible to produce layout designs, tailor-made to fit the end product if volume is sufficient to warrant special copper shells.

NEW DEVELOPMENTS IN TREATING CELLULOSE FIBERS FOR POLYESTER LAMINATES

by Arthur L. Smith, group leader, Applications Laboratory, Resinous Products & Chemical Co., Philadelphia, Pa.

Although contact resins have grown steadily in stature, as evidenced by the many decorative and other applications of laminated materials incorporating these resins, some outlets of high volume potential have been more or less closed to these laminates because of certain physical characteristics.

Early disadvantages of contact resin paper laminates were their relative lack of dimensional stability and permanence of properties under conditions of high humidity, as compared to commercial phenolic resin laminates. It was deduced, from experience in other fields, that this was due to the relative fundamental dissimilarity of cellulose (which is quite polar in nature) and the contact resin itself, which is relatively non-polar.

A commercially feasible treatment was devised, consisting of pretreating paper or cloth with a very low molecular weight formaldehyde condensation product (Uformite), which, when cured, does not interfere with the subsequent laminating operation with contact resins. This treatment stabilizes the cellulose fibers against moisture to a large degree.

Tests indicate that optimum concentration of Uformite for the type of pretreatment described is from 7 to 10 percent. The process is in pilot plant operation and has also had some actual production runs. In addition to its improved electrical properties, contact laminate on which the pretreatment has been employed shows excellent punching characteristics.

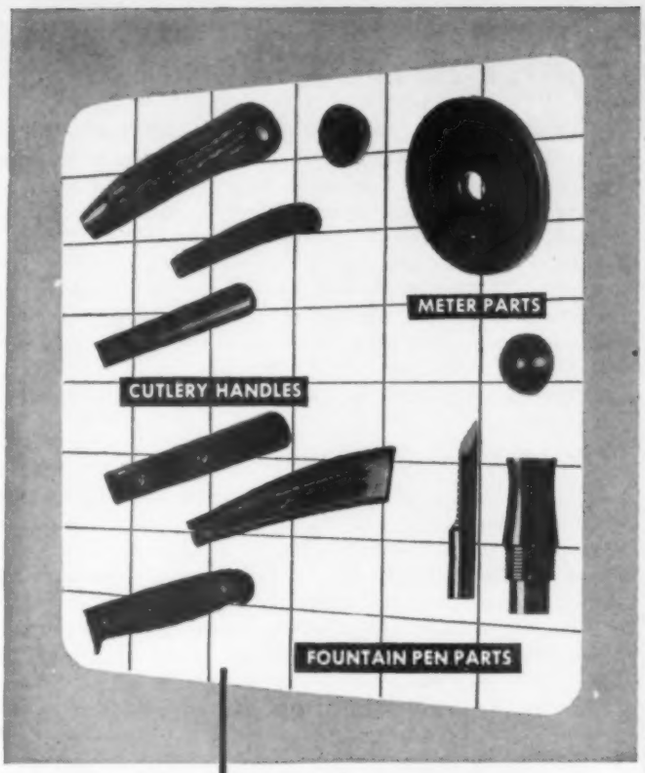
ECONOMICS OF REINFORCED PLASTICS

by W. Burdette Wilkins, consultant

From the standpoint of the manufacturer, the most important single fact about a product is whether it can be made at sufficient profit to justify its production. In the field of reinforced plastics, certain types of items lend themselves much more readily to profitable production than others.

Among the types of products best suited for this method of fabrication are relatively large articles which are to be produced in relatively small quantities, as well as certain objects of moderate size which involve compound curves difficult to achieve by other fabrication methods without entailing prohibitive cost. Products which must combine high strength with light weight, such as tooling jigs and dies, also lend themselves to the reinforced plastics field, as do large items such as boat hulls, where a homogeneous surface throughout is desirable. Finally, the process is often suitable for products in which dielectric properties are sought, and in household items in which a finished surface on one side only is sufficient.

Where volume requirements are such as to justify considerable die expense, the possibility that the product will work out more profitably when compression molded at higher pressures should be carefully investigated.



The manufacturers of products using these parts investigated and are now using hard rubber.

Is *hard rubber* the best *plastic* for your part or product?

With the development of synthetic formulas, hard rubber, one of the oldest plastics, became one of the newest. Improved formulas are constantly being developed in crude, synthetic and combinations of both. Just the formula you need for your part or product may have been recently developed.

Here are some of the reasons why many manufacturers use hard rubber for parts like those illustrated:

HARD RUBBER:

1. Withstands oil, water, heat, cold and changing temperatures.
2. Resists alkalies, hot soap solutions and most solvents and acids.
3. Finishes to lustrous ebony.
4. Resists chipping, splitting and cracking under normal usage or when dropped.
5. Machines well.
6. Molds beautifully.
7. Often costs less than other plastics.

If you are planning or using large quantities of a product that approximates these parts in size, shape, physical and chemical requirements, chances are that our experience and facilities for large volume production will fill your needs at reasonable cost.

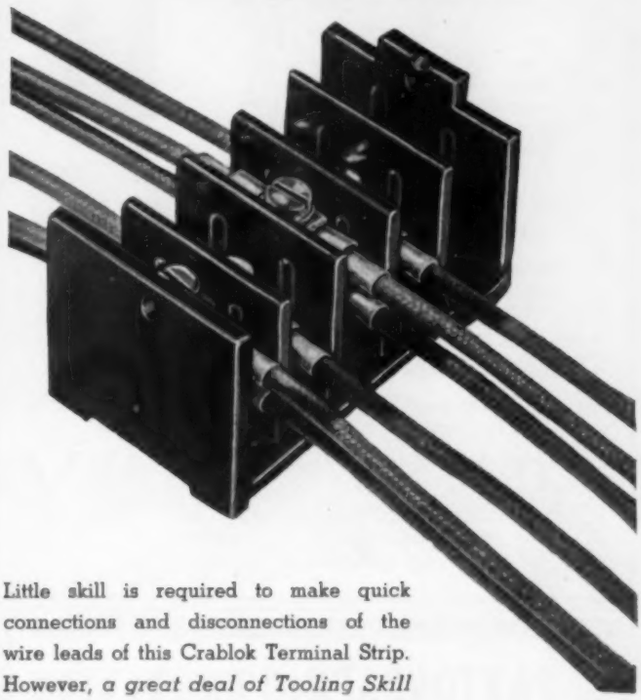
VULCANIZED RUBBER AND PLASTICS COMPANY

Manufacturers of Rubber and Molders of Plastics

General Offices:

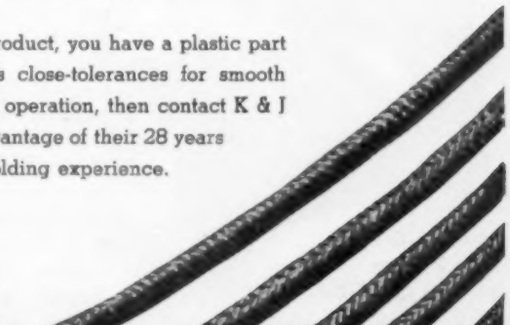
4 E. 29th Street, New York 16, N. Y.

Intricate Molded Bases by KUHN & JACOB on Crablok Terminal Strips for BURNDY



Little skill is required to make quick connections and disconnections of the wire leads of this Crablok Terminal Strip. However, *a great deal of Tooling Skill* was required to build a mold, which would produce such a compact and sturdy molded unit permitting multiple connections in a minimum of space.

If, in your product, you have a plastic part that requires close-tolerances for smooth and efficient operation, then contact K & J and take advantage of their 28 years of Plastic Molding experience.



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MOLDING and TOOL CO.

1200 SOUTHARD STREET, TRENTON 8, N. J.

Telephone Trenton 4-5391

CONTACT THE **K & J** REPRESENTATIVE NEAREST YOU

S. C. Ullman, 55 W. 42nd St., New York, N.Y. Telephone—Penn 6-0346

Wm. T. Wyler, Box 126, Stratford, Conn. Telephone—Bridgeport 7-4293

S.P.E. convention

(*Continued from page 85*) the shrinkage of parts over a wider range than with other means of preheating. To prevent any misunderstanding, it is emphasized that the amount of moisture in a properly functioning steam preheating oven is very small, causing a relative humidity of only about 1 to 2 percent.

Interesting data concerning the rate of softening of preforms in a steam preheating atmosphere have been accumulated by the use of a penetrometer, which shows the influence of very small amounts of moisture in greatly accelerated rates of softening.

METHODS FOR INDUSTRIAL COLOR STANDARDIZATION

by Paul M. Koons, The National Cash Register Co.

Color is forcing itself upon industry in general with sufficient proof of its functional value. The best instrumentation available today cannot do the job of cataloging the millions of possible color impressions irrefutably, but it is evident that all means of tying them down must be considered if color is to be controlled.

If the goal of sound color is to be attained it is going to require a concerted effort on the part of everyone involved in its use. The language of color alone will require concession from the three groups who deal in basic color; namely, the chemist, physicist, and psychologist. The spectrophotometer, glossmeter, and light booth will lead to many of the answers to the color problem. "Munsell," "Color Harmony Manual," and "Color Dictionary" are being used as visualizing aids. The purveyor of basic color materials can and must contribute to color standardization.

STRESS-TIME RELATIONS IN PLASTICS

by Albert G. H. Dietz, Mass. Institute of Technology

Equipment is described which provides control over rates of crosshead, rates of load application, and rates of either ordinary strain or true strain. The servo controls, special fixtures such as self-aligning locking jaws for reversed tension-compression cycles, and the methods of employing extensometers to control the motion of the machine are described.

Using this equipment and plastics ranging from hard and rigid to soft and extensible, typical stress-time curves and relations obtained under various rates of load and strain are presented.

STYRENE POLYMERS AND COPOLYMERS FOR INDUSTRY

by Reid G. Fordyce, Monsanto Chemical Co.

The topic is presented from the point of view of the advances that have been made in providing the plastics industry with polystyrene polymers and copolymers having greater versatility and wider fields of application because of improved properties. Each is discussed from the standpoint of the outstanding property, or combination of properties, that the material has to offer the plastics engineer. The actual and potential applications of these newer materials in a number of fields are indicated.

NEW ATTACK ON THE DEGRADATION OF PLASTICS

by F. W. Reinhart, National Bureau of Standards

The problem of the degradation of plastic materials has been investigated extensively but mostly from the viewpoint of overall changes in one or more physical properties. These physical changes, however, result from changes in the chemical structure. The logical method of attack on this problem, then, and the *only* one which will yield an entirely satisfactory solution is to determine the specific chemical reactions involved in the degradation of the plastic and how these reactions are affected by the intensity of the conditions encountered. Such a program is now under way at the National Bureau of Standards. Plastics are exposed to

controlled conditions of heat humidity, ultraviolet radiation, and ambient atmospheres and the gaseous degradation products are collected and analyzed with the mass spectrometer. The changes in the structure of the plastic are determined by ultraviolet absorption, infrared absorption, X-ray diffraction, electron microscopic, electron diffraction, and dielectric absorption characteristics. By collecting all the data these techniques give, attempts are being made to determine the specific mechanism of degradation.

MYCALEX 410—GLASS BONDED MICA IN MOLDED FORM

by F. L. Yerzley, Mycalex Corp. of America

Although Mycalex 410 is a ceramic, consisting of finely divided mica dispersed in a glass binder, it is molded in equipment and by processes resembling those employed in the transfer molding of phenolics. It may be molded with precision approaching that common to metal parts and is adapted to the inclusion of metal inserts capable of use as hermetic seals. Designs are discussed.

FABRICATING OF HEAT RESISTANT PLEXIGLAS

by Dr. O. L. Pierson, Rohm & Haas Co.

Heat resistant acrylic sheet, Plexiglas II, offers the well-known crystal clarity and good physical properties of the regular grade, plus a markedly higher resistance to heat.

Several new industrial applications requiring extra heat resistance have come along. For example, Plexiglas II has been used in street and industrial lighting, automobile visors, demonstrator units such as domestic washing machines, and vending machines.

Cementing of Plexiglas II is best done with a special cement. This avoids excessive soak times and will develop strengths nearly equal to that of Plexiglas II sheets if properly heat-treated. Forming Plexiglas II requires ovens operating about 20° C. higher than for Plexiglas I-A. These higher temperatures require more rapid handling during forming. In some cases heated molds are helpful. Examples of the fabricating techniques are discussed.

PHENOLIC RESINS IN SYNTHETIC AND NATURAL RUBBER

by J. Searer, Durez Plastics and Chemicals, Inc.

SOME RECENT PHASES OF FABRICATING TECHNIQUE

by J. W. Knight, The Fabri-Form Co.

The greater use of heavy sections and the demand for finer detail in fabricated parts have posed new problems of heating and forming heavy sections; equipment has necessarily been improved to accomplish the better control needed.

Methods of determining in advance the thickness of the flat sheet required to produce a finished article within minimum design specifications are necessary. No general formula exists here but from experience and with the knowledge that thinning takes place according to the pattern of a wedge, an estimate can be made.

THE THEORY OF COLORIMETRY AND ITS APPLICATION TO COLOR STANDARDIZATION

by Dorothy Dolton, Interchemical Corp.

Master color standards, because of their fugitive nature, are not as desirable as a spectrophotometric master standard which is a permanent record of the standard as originally accepted.

A universal color language, which allows the communication of a desired color, has been developed from the spectrophotometric curves and is known as the ICI system of color notation.

From these notations, color tolerances may be specified so that permissible changes in dominant wavelength, purity, and luminous reflectance may be determined.

From both spectrophotometric curves and ICI notations, it is possible to make color matches without an actual standard.

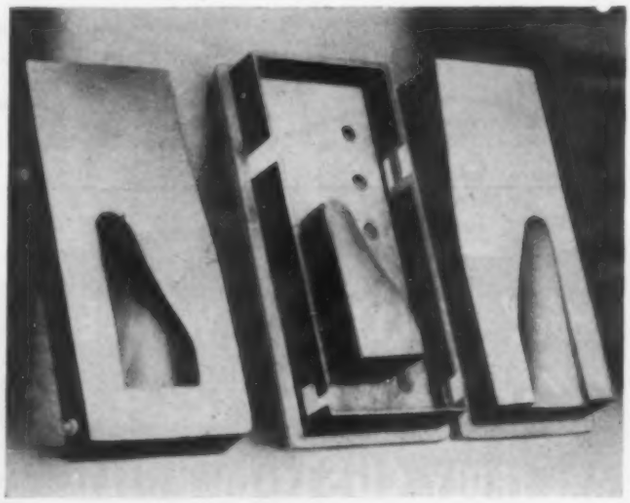
German aircraft tooling

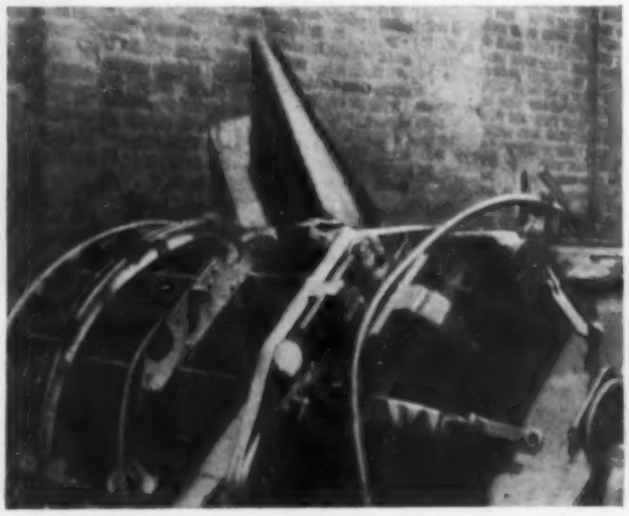
(*Continued from page 127*) ing aluminum sheet up to 0.100 in. in thickness, a pressure of about 2270 p.s.i. was employed.

A Mipolam trial punch produced 15,492 individual blanks in 2592 pressings on Dural stock varying from 0.024 to 0.040 inch. The punch was then refaced. Approximately 10,000 additional blanks were run in 1710 pressings. The punch was still in use when the war ended so that no exact figure on its potential productivity was available.

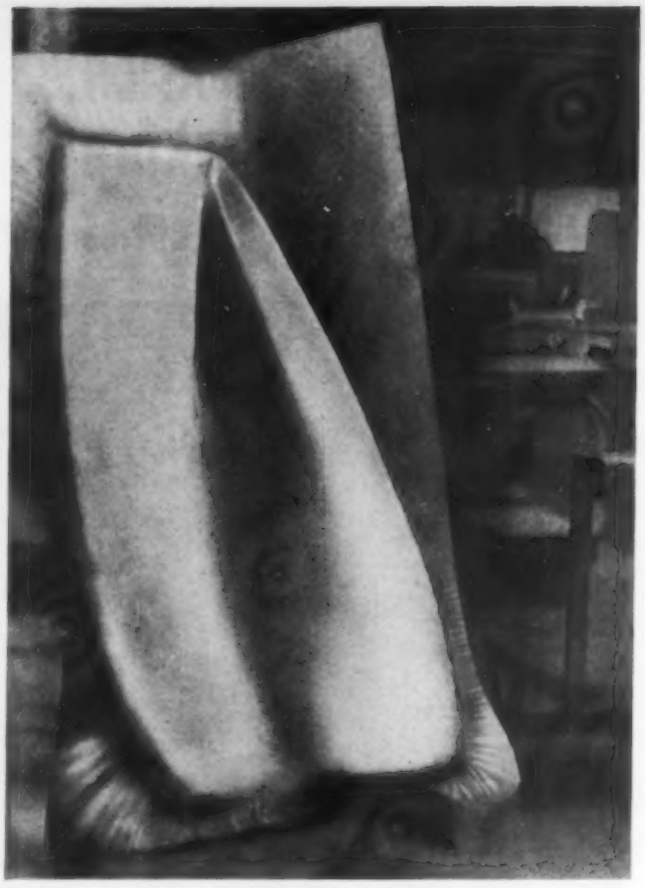
Compressed stabilized wood

The German aircraft manufacturers had made extensive use of Pressholz. This Tego-bonded material is similar to our compreg, but of lower resin content. It was sold in Germany under various trade names, such as Oboholz and Lignofol. Pressholz was used in forming dies, double action dies (Fig. 3), stretch-press dies, drill jigs, welding fixtures (Fig. 4), assembly jigs,





3 and 4—Double action die above and the welding fixture below are of compressed resin impregnated veneer



5—Air intake scoop formed on die faced with compressed resin impregnated veneer

and checking fixtures. Examples of these tools were found in the following aircraft manufacturers' and subcontractors' plants: Junkers,[1, 6] Dornier,[1, 3, 4] Messerschmitt,[1, 5] Heinkel,[1] Focke-Wulf,[2] Erla Werke,[6] Blohm and Voss,[7] Daimler Benz,[1] Hans Klemm,[1] and Volkswagen Werke.[2]

Pressholz was purchased by the aircraft manufacturers in large sheets up to 3 in. in thickness. If thicker dies were required, the panels were assembled with a cold setting urea-formaldehyde glue, Kaurit.[2] The tooling shops fabricated the dies in part with standard woodworking tools, but most of the machining was done with high-speed metal working tools. Superior speed and finish were obtained with carbide tipped tools, but their use was not extensive. The dies were machined to customary tooling tolerances, and it was specifically stated in one instance that dies could be machined to a tolerance of plus or minus 0.006 inch. The critical radius over which thin metal could be bent was given as $^1/_8$ to $^5/_{32}$ inch. If sharper radii were required, it was customary to recess a steel plate into the edge of the Pressholz die and to cut the radius in this plate. This expedient was also used to increase the service characteristics of Pressholz in stretch-press dies and double-action forming dies by reinforcing the point at which wear occurred. Aluminum sheet up to 0.080 in. in thickness was formed on Pressholz dies and steel sheet up to one half that thickness was also used. The

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Thermex RED HEADS

THERMEX and RED HEAD *T. M. Reg. U. S. Pat. Off.*

Messerschmitt organization normally called for a clearance of 0.020 in., but it was stated that in actual practice a clearance of 0.040 in. was usually allowed. In the fabrication of a given tool, reference lines were first cut to contour in the Pressholz blank and then the remaining area of the die was faired in.

Often two grades of Oboholz (Pressholz by Otto Bosse, G.m.b.H.) were combined in the production of a tool. Oboholz I, having laminations not in excess of 0.5 mm. in thickness, was used as a face material, and the body of the die was built up with Oboholz II which had coarser laminations approximately 1.5 mm. in thickness. The finer laminations gave higher strength and better wearing qualities. If a certain area of a die became unduly worn, a section was routed out and a new piece of Pressholz was cemented in place with Kaurit. The die was then reworked. These repaired portions were said to possess 80% of the original die strength.

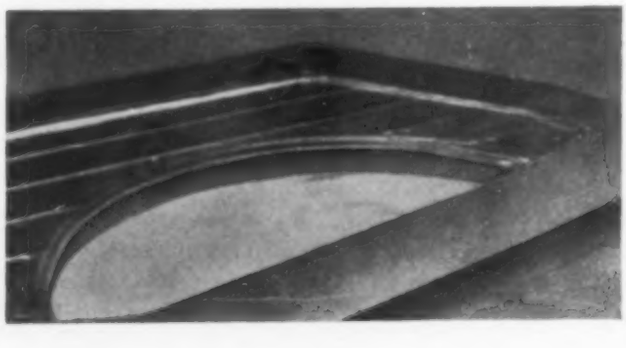
At the Daimler Benz main plant, one die of special interest was seen. This die was fabricated from hard maple and was faced with Pressholz about 2.5 in. thick. The over-all dimensions were 80 by 42 by 24 inches. The die was used in forming one half of an air intake scoop for the Messerschmitt 110 (Fig. 5, p. 186).

Another very interesting die was found in the Volkswagen Werke. This die was used to form one half of the side of the Volkswagen. It was roughly 4 ft. long, 3 ft. wide and 1 in. in depth. The actual depth of the formed part was of the order of 1 in. and reinforcing ribs approximately $^3/_{16}$ in. in depth transversed the flat areas (Fig. 6). Deep drawn parts were also made in this plant (Fig. 7, p. 190).

The life expectancy of these Pressholz dies was stated by Dornier and Messerschmitt to be of the order of 200 to 300 parts, depending upon the type of the die and the thickness of the material being formed. The Erla Werke reported 1200 to 1400 parts per die. Junkers reported 4000 parts on form dies at 1500 p.s.i. and 1200 to 1800 parts on draw dies before wear became appreciable.

Pressholz was considered to be only a substitute for tool steel, even though its performance was satisfactory. Most of the plants had from 100 to 200 various dies in their die storage areas, so that it was obvious that extensive use had been made of this material. Only petroleum lubricants were used on these dies,

6—Forming die of veneer with steel ribs



As One Businessman To Another

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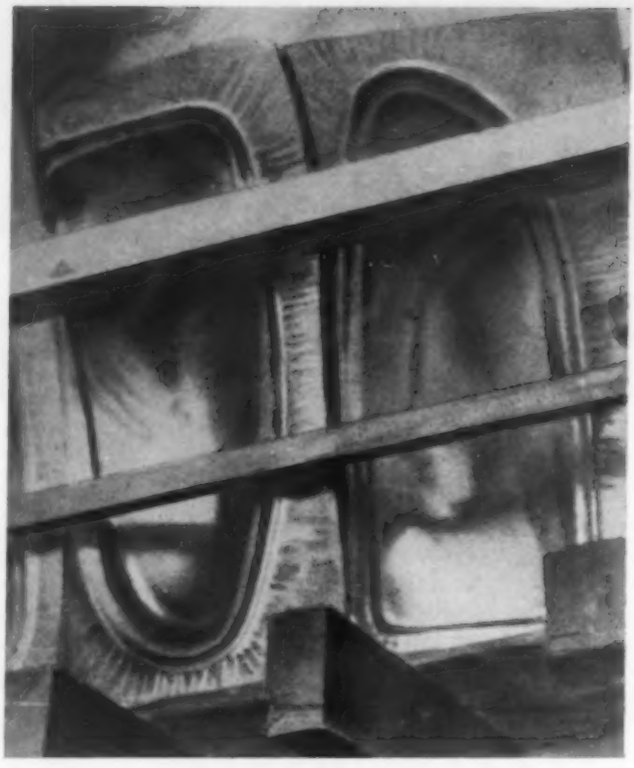

7—Fairings formed on double action veneer die

particularly a heavy grade of petroleum jelly. It was generally stated that under the prevailing weather conditions in Germany Pressholz dies were sufficiently stable to produce satisfactory parts over long periods of time, even though the dies were stored in open sheds.

Laminated cloth

One firm stated a preference for a laminated cloth material similar to our grade C phenolic laminate. This was the Hans Klemm organization which was engaged in repairing aircraft. Numerous forming dies and drill jigs of laminated cloth were observed in this

8—Double action die made of laminated cloth

plant. One forming die of special interest was a double-action die in which the holding ring was spring loaded (Fig. 8, p. 190). The drill jigs had pressed-in steel bushings to increase serviceability. Their preference for this material was based upon its stability and ease of fabrication in comparison with Pressholz.

Conclusions

On the basis of the evidence obtained in these investigations, it must be concluded that:

1) The German aircraft industry had made greater use of "Pressholz" or resin stabilized wood than had been done in the United States, primarily because tool steel was lacking and secondarily because the material facilitated the fabrication of tools.

2) The German aircraft industry had been much less aggressive in the application of castable thermosetting phenolic plastics, because the casting resins produced in Germany were generally unsuitable and because phenol and formaldehyde were scarce.

3) The German aircraft industry had only begun the application of thermoplastic compositions, because they did very little drop hammer work and because their Buna rubbers were satisfactory for rubber-forming operations.

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New latex

(*Continued from page 81*) they are finely divided particles of vinyl resin dispersed in water and stabilized. With the exception of the new 31X, these latices require the addition of plasticizer emulsions. Another series of Geon latices, identified as the "PX" series, are colloidal dispersions of pre-plasticized resin particles, the plasticizer having been added by a special process. Both of these two types require the film to be fluxed at elevated temperatures but the new 31X type requires neither high temperature fluxing nor addition of plasticizer.

Odorless, tasteless

The packaging industry, constantly on the alert for materials with low water vapor transmission and without migrating plasticizers, should find films made from 31X extremely valuable. One rapidly expanding phase of this industry is the prepackaging of food, particularly

fresh fruits and vegetables, prior to shipment to the retailer. 31X will be highly useful in this application because it is odorless, tasteless, and readily heat sealed—all requisites for an efficient food packaging material.

Developers have found that it can be spread or cast to form a 1-mil or even thinner, film, with a low water vapor transmission of 1 to 1.5 grams per 100 sq. in. per 24 hours. The m. v. t. of the free film is usually lower than that of Geon Latex 31X coatings on paper because the fibers in paper may act as wicks for water transmission. Despite this, paper coated with 31X latex is a possible entrant to capture part of the frozen food packaging market due to its resistance to low temperatures. The unsupported film does not have good enough low temperature characteristics for frozen food packaging because there is danger of brittleness. But with possibilities as unsupported film for fresh vegetable packaging and latex-coated paper for frozen food packaging, the developers are sure they will have a nice market.

Other packaging possibilities for 31X are papers coated with the material for use as food containers and food cap liners.

No heat or pressure needed

The excellent adhesion of the latex coatings to all porous surfaces without heat or pressure suggests its use for a host of applications. Among these are paper, cloth, twine, yarn, wood, and leather. Coated paper for shelves, wallpaper, and hospital supplies are only a few of the uses where resistance to greases and oils is a big factor. The latex also demonstrates good coagulant dip characteristics when used in conjunction with certain rubber latices such as Hycar OR-25 latex.

One of the most promising of all uses now under observation is the application of this latex as a coating for leather, to which it will impart improved age resistance and resistance to grease and oils. Developers believe that when 31X is spread on leather and embossed, it will make split hides look as good as top grain. The insolubility and inertness of the resin, which has no plasticizer to bleed out, make embossing and printing on the coated leather surface comparatively easy.

Fabric coated with 31X is adaptable for such uses as upholstery, tarpaulins, gloves, and women's handbags. The latex can also be used as a fiber binder for insulation materials and as a non-skid coating for rugs. The inert resin has no effect on varnished surfaces.

Methods of use

Unsupported films may be prepared by casting the latex on a glass or non-rusting metal surface and drying under infrared lamps or by circulating warm air. Only enough heat to evaporate the water is required in the drying process, but flash heating should be avoided as it will produce blisters.

Coatings of the new latex may be applied by such conventional methods as: 1) spreading (knife blade or air knife), 2) roller, 3) spray, 4) brush, 5) coagulant dipping.

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ity, any of these methods can be used successfully. Since the new latex can be applied by brush, its use as a protective paint is a possibility.

Films or coatings can be heat-sealed easily on standard equipment. When bonded to other types of plastic materials, such seals will retain their strength because there is no plasticizer to migrate into the bond.

Nature of the latex

31X latex is a polymer, furnished as a colloidal dispersion of modified vinyl resin containing 55% total solids. Its negatively charged spherical particles have a diameter of about 0.2 micron. The mechanical stability of the system is good, but freezing temperatures will cause coagulation, as will also the addition of alcohol or solutions containing divalent or trivalent cations. The pH, which ranges between 7 and 8.5, may drop slightly on prolonged storage; however, in most cases, this drop in pH does not have any appreciable effect on the stability of the latex and, therefore, the addition of a buffer is unnecessary. When the pH must be raised, the addition of sodium bicarbonate is recommended. The use of ammonia for this purpose should be avoided.

Physical properties of the latex are listed in Table I. Corresponding data on the better-known Geon Latex systems, 11X and PX-8, are included for comparison. (Geon Latex PX-8 is the plasticized form of Geon Latex 11X).

Probably the most noteworthy fact about the new latex is that unsupported film may be prepared readily from thickened latex without the use of plasticizers. Unplasticized 4-mil films have been cast on a metal plate, using the Filmograph,[1] dried at room temperature, and then fused for 2 min. at various temperatures. The tensile strength and elongation of these films, tested on a Scott I.P.-4 machine, are shown on the graph on page 81. The elongation results are reliable for comparative purposes only, since the jaws of the Scott machine permit creep of thin films during testing. The results in the graph demonstrate clearly that maximum strength and elongation of films prepared from 31X are developed on simple room temperature drying. Consequently, high temperature fluxing is unnecessary as it is with other latex films. However, heat may be desirable for hastening evaporation of the water carrier.

Films produced from 31X have good tear resistance and will not support combustion. Their stability to heat and ultraviolet light is somewhat less than that of films made from 11X or PX-8. When proper precau-

[1] Supplier: E. H. Aldinger, 237 S. Eighth St., Philadelphia, Pa.

Table I.—Latex Physical Properties

	31X	*11X*	*PX-8*
Color	White	White	White
Mechanical stability	Good	Good	Good
pH	7–8.5	8–9.5	8–9.5
Total solids, %	50–55	52–55	55
Specific gravity	1.25	1.165–1.180	1.120–1.130
Surface tension, dynes/cm.	34–40	37–47	35–42
Viscosity, centipoises	10–18	10–20	14–20
Particle size, microns	0.2	0.2	0.2

tions are taken in applying the 31X to smooth sized paper, good greaseproofness is obtained.

The results of the tests on 31X unsupported films and coated paper are presented in Table II.

Compounding

In general, thickening the latex to a suitable viscosity will be the only step desirable for coating and casting. This can be accomplished by adding 0.2 to 0.5 part of hydroxy ethyl cellulose[2] per 100 parts of dry resin, or high viscosity carboxy methyl cellulose-sodium salt in the same proportions. Thickening of the latex prevents the shrinkage patterns in thin films, improves wetting characteristics, and naturally reduces flow and impregnation tendencies.

Plasticizers, which are water-immiscible liquids, may be desired in the compounding and are best added in the form of stable emulsions. Such dispersions or emulsions should have approximately the same pH as the latex, preferably 7–9 for 31X, and must be of the oil-in-water type. They are prepared most conveniently with the aid of a suitable emulsifying agent in a homogenizing mixer, a colloid mill, or similar equipment. It is desirable to obtain as fine an emulsion as possible with no air bubbles or foam present. Ordinarily, emulsions

Table II.—Properties of 31X Films and Coated Paper

Property	*31X*
Fusion temperature	Room temperature
Elongation, of unsupported film, %	700
Tensile strength, p.s.i.	2000–2500
MVT	1.2–1.5 g./100 in.²/24 hr.
Greaseproofness	Good

prepared by shaking or stirring contain relatively large droplets and even under the best of conditions it is difficult to obtain uniform particle size. The particles of plasticizer will generally be many times the size of the latex particles.

Water-soluble or dispersible solids such as the protective colloids and thickening agents are readily incorporated in the latex. In most cases, it is preferred to make up a slightly alkaline solution of such a material in water and then add the resulting solution with slow stirring to the latex.

Insoluble solids such as pigments, fillers, and carbon black are prepared in dispersed form with the aid of suitable dispersing agents just as in rubber latex technology. For this preparation, the ball mill and the Szegvari Attritor are well adapted. Certain colloid mills, such as the Charlotte Mill, are also useful for dispersing solids which consist of aggregates of fine particles. The milling time, amount of dispersing agent, and concentration of dispersion will vary somewhat with the nature of the system. Dispersions are added slowly to the latex in the same manner as plasticizer emulsions. It is also possible to prepare mixed dispersions of several solid pigments. (*Turn to page 200*)

[2] Supplier: Carbide and Carbon Chemical Co. (Cellosize, Grade WS 500, Blend 3).

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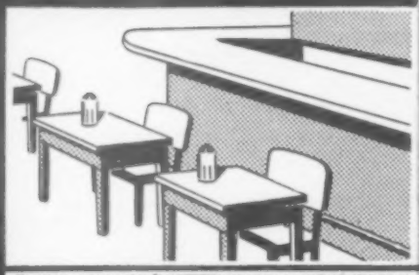

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It is sometimes necessary to add a protective colloid or stabilizer to the latex before compounding. Since it takes some time for protective action to develop, it is well to allow the protected latex to age several hours before adding the dispersions for compounding. Up to 1% of the stabilizer, on the dry resin basis, is generally sufficient. A borated casein solution is recommended.

Colored latex compounds are easily made by the addition of water-dispersible pigments. It is advisable to wet out these pigments with a little water to insure ease of mixing and uniformity of color. Opaque colors can be obtained by adding to the latex compound a suitable amount of opaque white, such as titanium dioxide.

Coagulant dipped films can be made by the patented Anode process[3] using a mixture of 31X and Hycar OR-25 latex, in which case the 31X latex may be varied within the limits of 10 to 80%. The proportion of each material going into the mixture is determined by the properties desired in the finished article. These properties can range from flexible, non-elastic to elastic as the Hycar content is increased. Neither latex gives a coherent deposit alone in the coagulant dipping process.

[3] American Anode, Inc., 60 Cherry St., Akron 8, Ohio.

Case hardening

(*Continued from page 125*) ness versus time is plotted. The curves indicate that an increase in temperature first accelerates the softening of the surface and later accelerates an increase in ratio of surface hardness to core hardness. As a result, the curves for these temperatures cross in almost a common point. This phenomena can be noted for a 1-min. treatment of a cube at any temperature.

Little change in the ratio was found for short time intervals below 300° F. After 30 min. at 300° F., the ratio reached 1.15. The optimum value was 1.20 when treated for 15 min. at 350° F. in oil, resulting from a surface hardness of 110 and a core hardness of 92. This condition, however, cannot be improved easily, because when treated at 350° F. for 30 min., the cube broke into two pieces and the centers of the planes were bulged noticeably (Fig. 4, p. 204).

The results of case hardening in air show the same trends exist, but more time is needed for similar results.

A series of standard test specimens made from the Catavar #101 resin were treated in oil in the same way. The optimum conditions of treatment, as indicated by the hardness ratio results from the 2-in. cube experiments, were used in an attempt to bracket the highest physical property values (Table II, p. 125). However, initial runs gave physical properties improved to the extent that tests were made over the entire temperature range of the cube experiments.

When treated at 200° F. for one day, the curve of flexural strength versus time had reached a plateau, while the compressive strength and shrinkage were still

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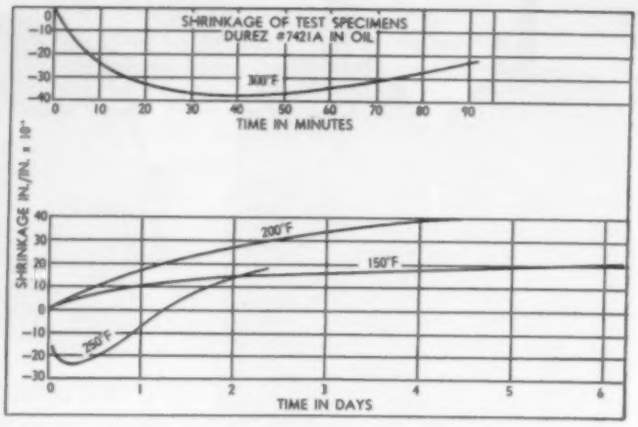


2—Here, standard test specimens of the casting resin were treated in same manner as cubes

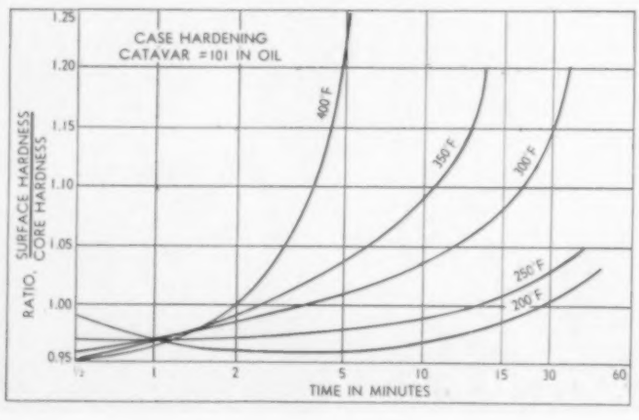
rising. These curves are shown in Fig. 5 on page 204.

The curves for treatment at 250° F. were essentially the same as those for 200° F., except that the increased temperature had accelerated all factors and had raised the corresponding values considerably. The data clearly showed that the maximum flexural strength was attained after one day of treatment, after which a gradual decrease began. A maximum increase of 74% in compressive strength was achieved by treatment for two days at 250° F.

At 300° F., the Izod impact values rose slightly at the beginning of the treatment, then reached a plateau value of about 0.24 ft.-lb./in. of notch. The shrinkage increased w th time (Fig. 6, p. 206). Flexural strength rose sharply in the short time treatment area of the graph, then tended to level out, and finally decrease. Little effect on the compressive values was attained in the first 20 min., but the curve rose sharply for the next 30 minutes. It is apparent that the best balance between physical properties and shrinkage is attained by a 1-hr. treatment. The moduli of elasticity in both flexure and compression did not change sufficiently to give an indication of a definite trend.

With treatment at 325° F., both the compressive and flexural strengths increased considerably. The maxi-

3—Ratio of surface hardness to core hardness versus time is plotted for cubes



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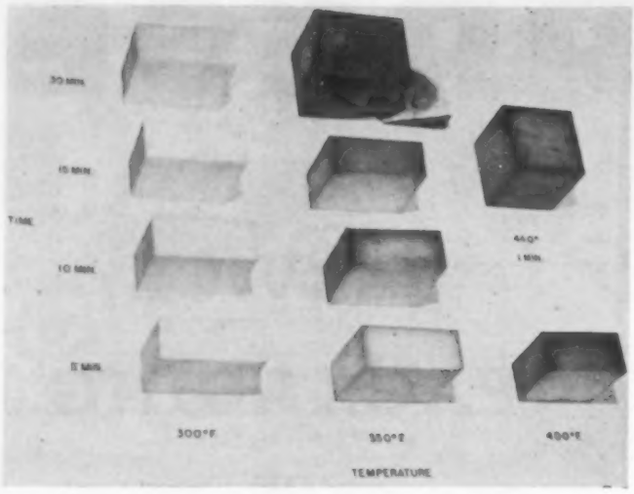
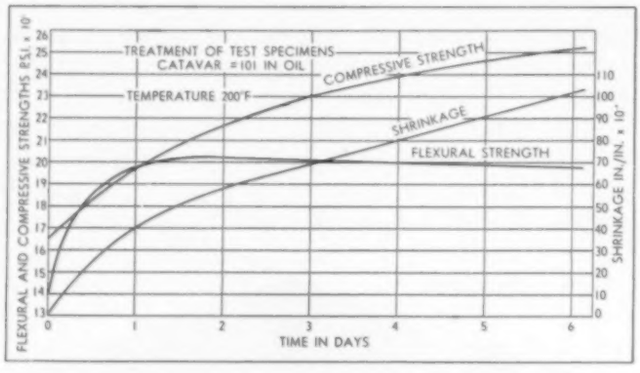


4—Treated at 350° F. for 30 min, the cube at top center broke into two pieces



5—Physical properties of standard test specimens after treatment at 200° F. for one day

mum conditions were reached after about a 1-hr. treatment, at which time the compressive strength had increased 59% and the flexural strength 64 percent. The data for the flexural strength curve, however, did not give a smooth curve and when treated for 90 min., the flexural strength had been seriously decreased. The modulus of elasticity in flexure was increased during the initial part of the run. The shrinkage increased at the beginning of the run and gradually leveled off so that an increase in time brought no further increase in shrinkage. The maximum increase of 0.002 in./in. was reached after 40 minutes.

A series of test specimens were case hardened in oil at 350° F., but some of these cracked through their entire volume. Worthless specimens resulted when the treatments lasted over 7 min. at 350° F.

For all temperatures the compressive strength and shrinkage (except 325° F.) appeared to be still increasing as approximately a straight line function at the end of the treatment and the flexural strengths had either reached a plateau or were decreasing. It is, therefore, evident that a compromise must be made between the increase in compressive strength on the one hand and the decrease in flexural strength and increase in shrinkage on the other. Higher temperatures accelerate the

case hardening effects without bringing undue difficulties in making the necessary compromises so far as physical properties are concerned. When the advantages of slightly higher Rockwell hardness are added to this, it can be concluded that a temperature of 300° F. should be high enough to get the desired accelerated effects and low enough to eliminate the danger of damage to the castings.

Conclusions

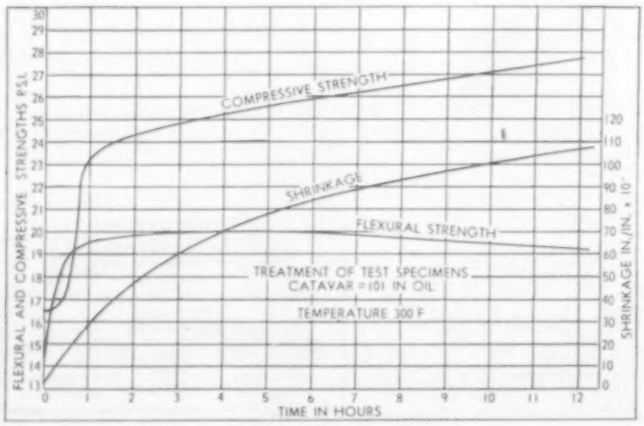
From our empirical observations and these data, the following conclusions may be drawn:

1. Acid catalyzed phenolic casting resins did not behave the same as the non-catalyzed resins subjected to heat treatment.
2. The case hardening treatment improved the properties of the non-catalyzed resins more consistently than it improved those of the catalyzed type.
3. The case hardening treatment initially produced a softening, but this trend was reversed and hardening resulted from longer treatment.
4. A temperature of 300 to 325° F. produced improved physical properties safely and more rapidly than lower temperatures. At temperatures above 325° F., the time factor was critical and damage to the castings resulted from prolonged exposure.
5. The order of preference for a case hardening medium was oil, air, metal.
6. Decided improvements in the physical properties of castings were achieved through case hardening. Further, in some cases finishing operations might be eliminated through the use of heat treatment. The production of higher skin hardness should lead to longer casting life through lower wear.

Acknowledgment

The authors acknowledge the fine supervisory efforts of: G. H. Cartledge, dean of the faculty of Kings College, formerly head of the Materials Dept. Curtiss-Wright Corp., Airplane Division Research Laboratory; and of P. K. Porter, head of the Materials Dept., Cornell Aeronautical Laboratory.

6—Results of treatment of standard test specimens at 300° F.

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FOR SALE: Hydraulic Presses; 30" x 30", 17" ram, 340 ton, 36" x 36", 16" ram, 250 ton, 36" x 52", 14" ram, 385 ton, 26" x 30", 15" ram, 177 ton, 26" x 30", 10" ram, 118 ton, 19" x 24", 10" ram, 78 ton, 23" x 17", 8" ram, 75 ton, 22" x 15", 8" ram, 75 ton, 15" x 15", 8" ram, 75 ton, 12" x 12", 7½" ram, 50 ton, 12" x 12", 6½" ram, 42 ton, 8" x 9½" 4½" ram, 20 ton, 16" x 16", 3½" ram, 12 ton. Pumps: New Dual Rotary Pumping Units; HPM Triplex 1½ GPM 2500#; Robertson Duplex 1½ GPM 4000#; Worthington 2½ GPM 4000#; Watson Stillman Duplex GPM 2500#; Laboratory Mill 7" x 14"; Extruder No. 3 Royle Perfected; W&P unjacketed sigma blade mixer, 100 gal. cap. Laboratory Presses. Hydro-Pneumatic and weighted type accumulators, etc. HIGHEST PRICES PAID FOR YOUR USED EQUIPMENT. Universal Hydraulic Machinery Company, 285 Hudson Street, New York City 13.

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Stock of Saran Tape mfg. by National Plastic Products Company 2" x .030"

1200 lb Red

1000 lb Green

3900 lb Yellow

50¢ per lb fob our factory

Timmerman Lumber & Mfg. Co.

Hibbing, Minnesota

FOR SALE: ¾ oz. Van Dorn injection Machine, Model No. 1. Used less than ten hrs, excellent condition, not required for our operations. Clinwill Plastics, Inc., Buffalo 3, N. Y.

LEADING ENGLISH Injection Moulder, with own toolmaking and marketing facilities, wishes to contact American firms to consider production in the sterling area using either tools supplied from U. S. A. or mfgd. in England to American designs. Box C470, Modern Plastics.

WOOD FLOUR & PLASTIC

Firm in Norway wants to contact buyers of wood flour.

NILS HAUGSTVEDT

Uranienborgveien 13,

Oslo, Norway

LEADING ENGLISH firm of plastics manipulators wish to contact American manufacture of Vinyl floor covering, preferably in tile form, with a view to production in England for distributing to the sterling area. Reply Box 468, Modern Plastics.

WANTED, CHEMIST with exp. in phenolic molding resins and compounds. Excell. opportunity for right man. Write giving full qualifications and salary expected. Our employees notified of this ad. Your replies held in strictest confidence. Box C542, Modern Plastics.

FOR SALE—1—Watson Stillman Hydro-Pneumatic High and Low Pressure System, complete with pumps, tanks, boilers, etc., for 3000# operation. 2—Baker Perkins 100 gallon Plastic Mixers. 1—12" x 12" Press 7" Ram. Steel Heated Platens and Hand Pump attached; 1—24" x 24" Adamson, 10" ram, 2-opening Hydraulic Press; 1—24" x 24" Farrell 10" ram, 2-opening Hydraulic Press; 1—30" x 30" D&B, 2-open, steel heated Platens 12" ram; 2—La Pointe Hydraulic Pumps, 150 G.P.M.—2000 lb. pressure direct motor driven to 125 HP AC motors; 1—French Oil Hydropneumatic Accumulator; 1—14" x 24" Press, 9" ram; 6—Hydraulic Presses, 20" x 20", 12" x 14"; Dry Powder Mixers; Pulverizers, Grinders, etc. Send for complete list. Reply Box 1545, Modern Plastics.

FOR SALE: Angle Molding Hydraulic Press Watson-Stillman, suitable for Split Molds and for Molding Complicated Parts by the transfer method. 3 horizontal double acting rams, 13½", 8" and 6" arranged in "T". Reply Box C132, Modern Plastics.

DO YOU NEED a Hydraulic Press for Compression Molding, Transfer Molding, Laminating, Forming, Bending, and Hobbing? Many sizes hydraulic presses and pumping units available. New motors from 2 to 7½ H.P., 220 volts, 3 phase. Whatever it may be, if it is hydraulic, see Sal-Press Company, 388 Warren Street, Brooklyn, N. Y.

FOR SALE—HYDRAULIC PRESSES: 1-Watson-Stillman 150 ton, 30" x 28" platen, 16" ram; 3-Southwark 150 ton, 31" x 19" platens, 16" ram; 1-Burroughs 100 ton, 28" x 13" platens, 2-9" rams; 2-Baldwin-Southwark 75 ton, 24" x 18" platens, 11" ram; 3-Watson-Stillman 35 ton, 12" x 12" platens, 8" ram; 1-7 ton, 15" x 15" platens, 3½" ram; 1-HPM Hydro-Pneumatic Accumulator, 650#, 4'6" x 12' tank with IR 30 Compressor; 2-Steam Driven Hydraulic Pumps, 15 and 30 gpm, 3000# and 5000#; 1-Baker Perkins 100 gal. jacketed double arm Mixer; 25-Stokes Preform Presses "R", 2½"; "T", 1½"; RD4 Rotary, 1"; Colton Rotary, 35 punch, ¼"; Day, Readco, from 4 to 150 gal. double arm Mixers; 2-Ball & Jewell #0 and #1 Rotary Cutters. BRILL EQUIPMENT COMPANY, 225 West 34th St., New York 1, N. Y.

CONTACT REQUIRED with American firm engaged in printing and embossing Vinyl calendered sheet and Polythene sheet by established firm of plastics manipulators in England who wish to produce and distribute these products in the sterling area. Reply Box C469, Modern Plastics.

FOR SALE—Approx. 3450# Vinylite VC-5901-various colors; 5100# Celon Ethyl Cellulose—Amber color 1688# Tenite #1—Amber Color; 663# Tenite #1—Crystal Clear; 866# Tenite #2—Amber Color 4170# ⅛" Lumarith Cellulose Acetate—various colors; 490# ⅛" Lumarith Cellulose—pink color. New material—Immediate delivery. Write with best offer. We reserve right to reject any bid. To be sold subject to prior sale and credit approval. A. S. Campbell Co. Inc., 161 Prescott St., East Boston 28, Mass. Tel.—East Boston 7-4020.

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Sales Engineers—Top Flight Located in Chicago — Cleveland — Boston — St. Louis — Rochester — Philadelphia One of best equipped mfg. plants—pioneer developers and specialists in decorative tri-dimension injection molding plastic products. Serving many industries. Must be experienced and capable of 5 figure earnings on straight commission basis. Write Box C535, Modern Plastics.

FOR SALE: 500 ton Hydr. Molding Press 42" x 48"; Field 500 ton 25" x 30"; Francis 200 tons, 24" x 18"; Thropp 175 ton 36" x 36", 6 openings; also 20 to 250 tons from 12" x 12" to 36" x 36"; 40 ton Broaching Press; Watson-Stillman Hor. 4 Plgr. 1" x 2" x 4" H.&L. Pressure Pumps; HPM 1¾" x 6" vertical triplex 10 GPM 2700 lbs.; 7 Hydr. Oil Pumps, Vickers, Oilgear, Northern, etc., Elmes 1" x 4" & 1½" x 4" hor. 4 plgr. 3 to 8 GPM 4500 lbs. & 5500 lbs.; Elmes 2" x 6" hor. 30 GPM, 2500 PSI; Rumsey 4½" x 8" vert. Triplex 65 GPM 900 lbs.; Elmes 2½" x 4" hor. 17 GPM 850 lbs.; Hydr. Steam Pumps; Low Pressure Pumps 150 to 600 lbs.; Hydr. Accum; Stokes type 200 Automatic Molding Press, Stokes Rotary Preform Tablet Machines 1⅛", 1½" and ⅝", also single punch; Injection Molding Machines 2 oz. to 12 oz.; Baker Perkins jacketed Mixers 100, 50, 20 & 9 gals. capacity; New Rotary Cutters; Rubber Mills; Calenders, Banbury Mixers, etc.; Heavy duty Mixers; Grinders; Pulverizers; Gas Boilers; etc. PARTIAL LISTING. WE BUY YOUR USED MACHINERY. STEIN EQUIPMENT CO., 90 WEST ST., NEW YORK 6, N. Y. Worth 2-5745.

CHEMICAL ENGINEER—Seeks association with injection or extrusion molder. Past 4 yrs. production manager with cold molder. Formulator, mechanical aptitude, creative, good knowledge of plastics. Production, sales or combination desired. Box C536, Modern Plastics.

WANTED
EXPERIENCED EXTRUDER REPRESENTATIVE

By growing, progressive manufacturer. Straight liberal commission. Territories fully protected. Allied, non-competing lines and engineering background an asset. Write in detail, confidentially, experience, established contacts, etc. Box 82 Roselle, New Jersey

INJECTION machines wanted Prefer Reed-Prentice, 8 oz. machine, but will consider other machines. Give full details and asking price in your letter. Box C539, Modern Plastics.

EQUIPMENT FOR SALE: 2—National Rubber 2½" Std. Plastic Extruders with steam conversion attachments and controls. 2—40 ft. Conveyor cooling units with air ducts, blowers & Motors. 2—Drying units with 3 compartments. 2—Scrap Grinders, Cut-Off machines and reef multiple spindle spoolers. We have discontinued our Plastic Dept. Must be sold at once to obtain additional factory space. Write with best offer. We reserve right to reject any bid. A. S. Campbell Co. Inc., East Boston 28, Mass.

WANTED INJECTION MOLDING FOREMAN Several years experience in production and supervision of injection molding department. Knowledge of compression and transfer molding desirable, but not essential. Salary open. With progressive Eastern manufacturer. Box C541, Modern Plastics.

PLANT MANAGER with 20 years' Supervisory and Managerial experience in cold molded and thermo-setting plastics. Compression, jet and transfer molding. College Graduate, Ch.E. degree, qualified engineer in plant layout, hydraulic and high pressure steam systems. Thorough knowledge of personnel management, estimating, mold design, molding and finishing operations, production and cost control, sales practices, etc. Invite investigation of past record, it is proof of my capabilities. References furnished. Reply Box C555, Modern Plastics.

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FOR SALE: Cellulose acetate molding powder at sacrifice price virgin material original packing in sealed drums. 2000 lbs. Tenite I transparent blue color #19442-M formula 002a. 2500 lbs. Tenite I transparent green color #19297-M formula 002A. 43½¢ lb. 220 lbs. baby blue opaque acetate Gering 29¢ lb. Prices FOB New York City, samples on request. Box C546, Modern Plastics.

WANTED: 2 or 4 ounce injection molding press Vertical press preferred. Please give full description of press, age, condition, and price of press. Box C543, Modern Plastics.

FOR SALE

1—50 Ton Watson-Stillman Press, down moving ram, 7½" ram, 15" stroke, 24" daylight, 25" sq. platens, pull back ram. 1—75 Ton Hydraulic Press, up moving ram, 12" ram, 12" stroke, 15" sq. platens, 21" daylight, complete with pump and operating valves. 1—50 Ton Watson-Stillman Press, up moving ram, 7½" ram, 12" x 14" platens, 18" daylight. 1—New Glasscloid Laminating Press, 3-10" x 12" electrically heated platens, self contained unit. 1—20 Ton Northern Hydraulic Press, self contained unit. 5—Hydraulic Pumping Units equipped with Vickers Pumps and 3 HP motors. Watson-Stillman High and Low Pressure Pumps. Vickers Pumps. 1—Watson-Stillman 5½" x 6' Hydraulic Accumulator Type 5. 1—100 Ton Molding Press, 10" ram, 20" daylight, 11" stroke, 19" x 17" platens. 1—30 Ton Molding Press, 9" ram, 18" daylight, 14" sq. platens. These two presses are complete with pumping units and operating valves and can be seen in operation. Reply Box C544, Modern Plastics.

CONSULTANTS: Staff of 3 Ph.D.'s, experience totaling 30 yrs, offer positive aid on problems in synthetic resins, plasticizers, polymerization, organic chemicals, catalysts, fatty oils, surface-active agents, soaps, additives, etc. An organization small enough to give your problems meticulous personal attention. Reasonable rates. Box C545, Modern Plastics.

FOR SALE: PLASTICOATER, as new. Capacity 600 lbs. 230 Volts, 3 phase, 60 cycle. Made by Youngstown-Miller Co., September 1946. Type 15/20 with large dipping compartment. Heated tap and valve if plastic casting is desired. Cost $1130, will sell for $600.
Wenzel Company, Trenton, N. J.

FOR SALE: Quantity Plastic sheets—Laminated resinweld. Standard and other sizes. Attractive prices. American Wood Products Co. Box 347, Chippewa Falls, Wisconsin.

WANTED: CUSTOM MOLDING REPRESENTATIVE

Injection molding plant located in the South will consider appointment of representative for custom molding. Commission basis. Reply Box C547, Modern Plastics.

FOR SALE—1-10 cavity Compression Mold. Excellent Condition. Plastic Toy Racer can be molded to sell at retail for 10¢. Length 5½, Width 1½", Height 2". Send for sample of Racer. Also 1—4 cavity-Injection Mold for same racer. D & L Toy Company, 4012 Saline Street, Pittsburgh 17, Pa.

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Hydraulic installations—repairs modifications and hydraulic power units built to specifications by hydraulic specialists.

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TECHNICAL REPRESENTATIVE: B.S., 5 yrs. research and development of organic chemicals. Technical sales experience in plastics, emulsifiers, resins, waxes, plasticizers, etc. Desires permanent technical representative position. Employed as project supervisor, synthetic rubber pilot plant. Married. Family. Age 33. Box C548, Modern Plastics.

MOLDS WANTED

Turn your out-styled molds into cash. We will pay cash for injection and compression molds in any condition. Send samples of production and full details in your letter to Box C540, Modern Plastics.

CHEMIST AND TECHNOLOGIST, well experienced, especially in large scale plastics and rubber compounding, desires responsible post. Just arrived from England, but widely traveled including States. Young and active. Capable of supervising production, research for new mixes and products. Proven ability. Box C549, Modern Plastics.

COMPRESSION PLASTICS ENGINEER. A small compression molding plant desires the services of an engineer. Must be thoroughly acquainted with setting dies, design of molded pieces, materials and other related molding problems. Experienced preferred. Reply stating qualifications and any other pertinent information. Box C550, Modern Plastics.

FOR SALE—HPM 2 oz. injection molding machine in good condition. Box C551, Modern Plastics.

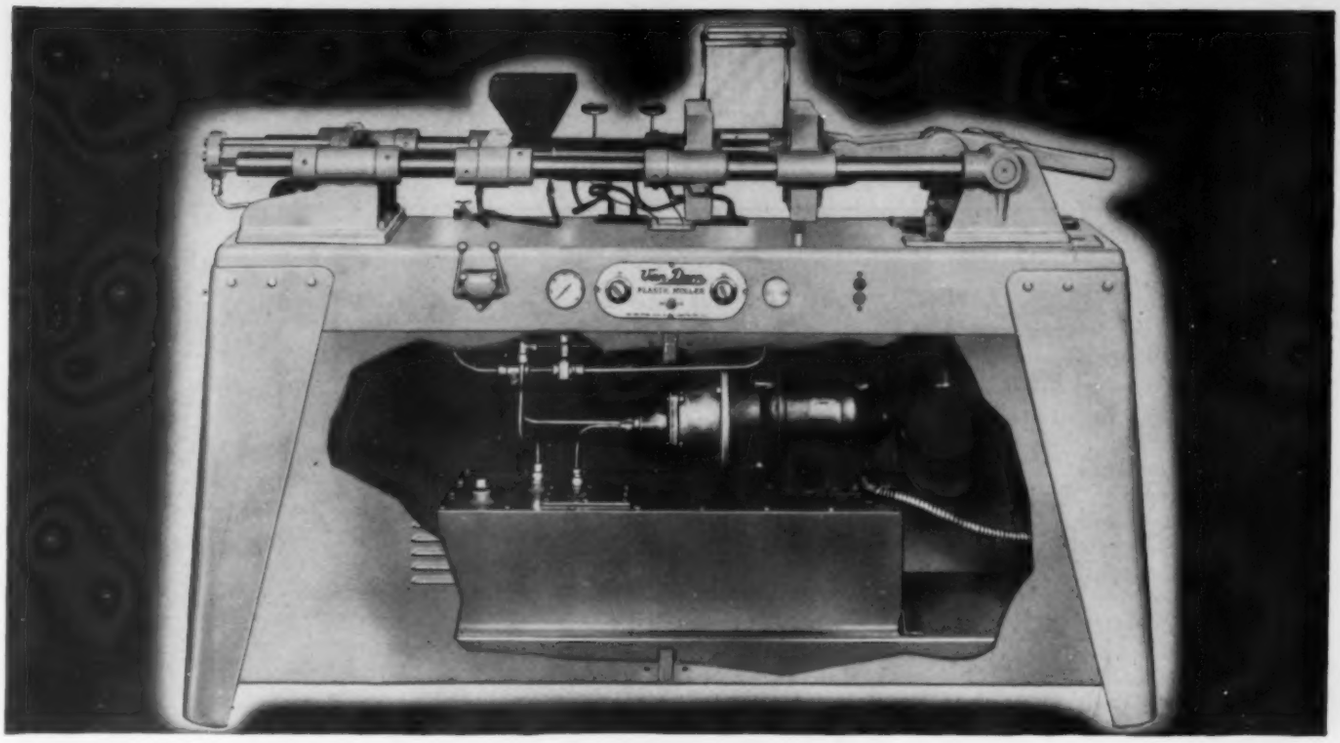
PLASTIC MOLDS FOR SALE
at fraction of cost
multiple cavity injection molds for sun glasses, coasters, cigarette cases, tumblers, soap boxes, etc. Excellent condition. Can be seen in operation. Box C553, Modern Plastics.

WANTED Research man experienced in the production of resin bonded grinding wheels. Must be under 35 and interested in research and development work. Write giving full particulars concerning education, experience and salary desired. Box C554, Modern Plastics.

FOR SALE, in Southern California, an Injection Molding Plant, complete with tool room, open contracts, etc. Now operating 24 hours a day. All standard modern equipment. No property to buy. Reply Box C511, Modern Plastics.

WANTED FABRICATOR who is equipped or can equip for manufacturing low pressure laminate boat hulls 11 ft. long fiberglas or sisal reinforcement. Box C537, Modern Plastics.

WANTED: Experienced man to supervise injection molding plastic plant. Write full details. Box C552, Modern Plastics.



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AND *THIS REMARKABLE PRESS COSTS UNDER $2000!*

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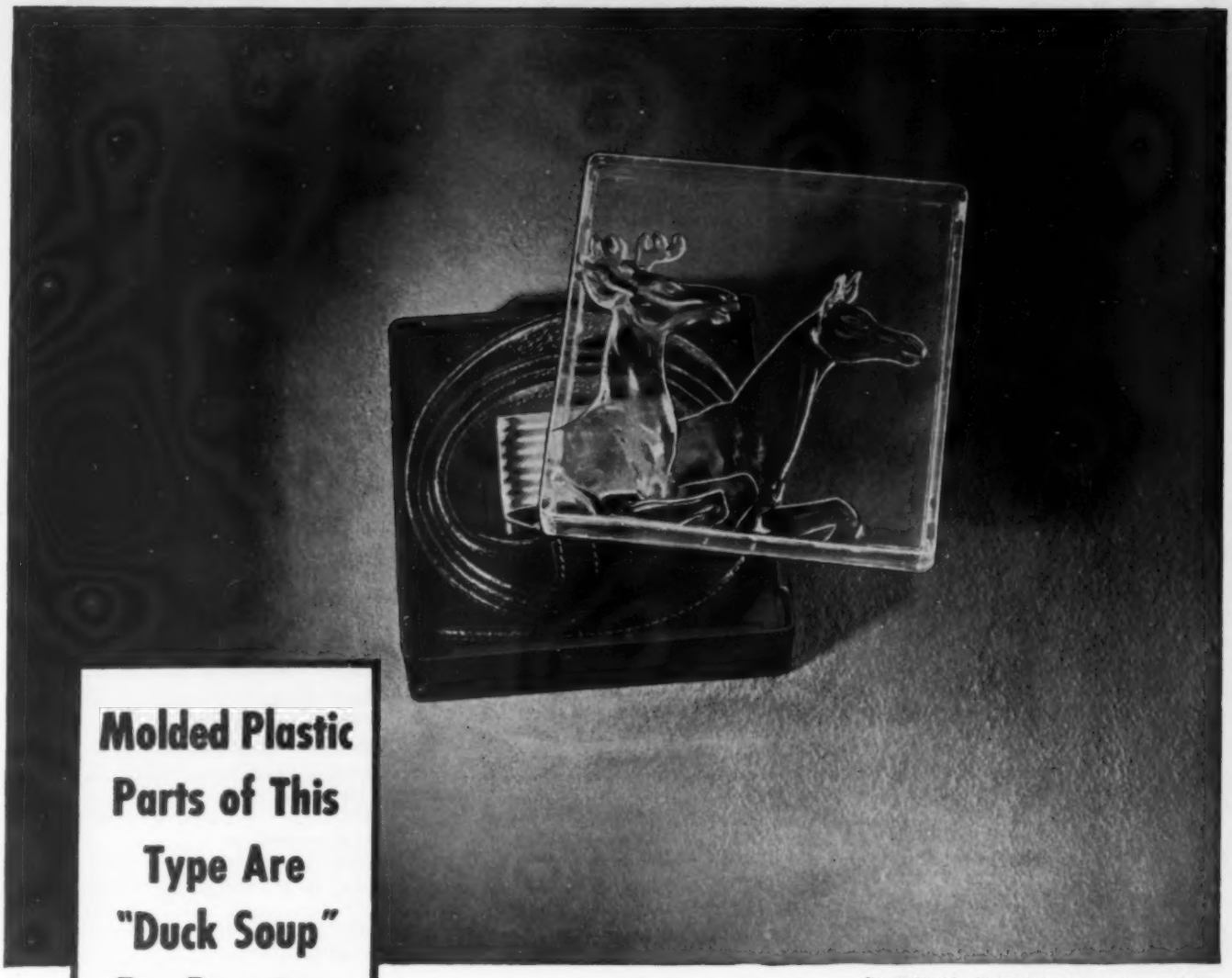
MODERN PLASTICS ADVERTISERS

FEBRUARY 1948

(Please turn to page 214)



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(Please turn to page 216)

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MODERN PLASTICS

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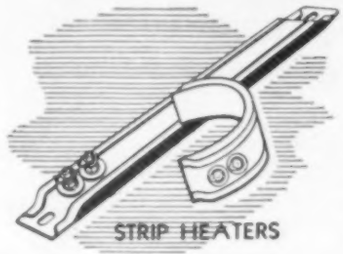

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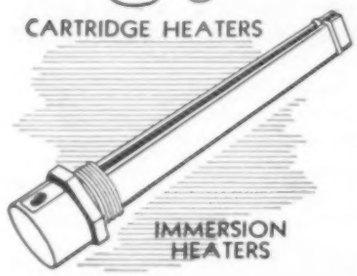

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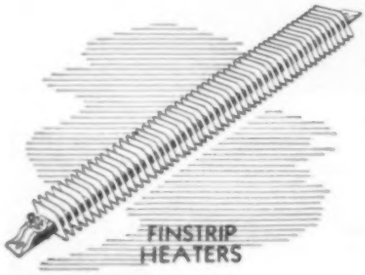

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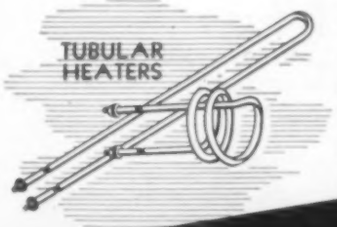

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G-E COMPLETE SERVICE—AT NO. 1 PLASTICS AVENUE

Backed by 53 years of experience. We've been designing and manufacturing plastics products since 1894. General Electric research facilities have expanded continually, working to develop new materials, new processes, new applications for plastics parts.

No. 1 Plastics Avenue—complete plastics service—engineering, design, mold-making. G-E industrial designers work with our engineers to create plastics parts, sound and good looking. Skilled mold-makers in G-E toolrooms average over 13 years experience.

All types of plastics. Compression, injection, transfer and cold mold facilities . . . high and low pressure laminating . . . fabricating. G-E Quality Control—a byword in industry, means as many as 160 inspections and analyses for a single plastics part.

EVERYTHING IN Plastics

GENERAL ELECTRIC

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General Electric plastics factories are located in Scranton, Pa., Meriden, Conn., Coshocton, Ohio, Decatur, Ill., Taunton and Pittsfield, Mass.